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ABSTRACT

Presented in these teacher's guides for grades seven and eight are lesson plans and ideas for integrating mathematics and environmental education. Each lesson originates with a fundamental concept pertaining to the environment and states, in addition, its discipline area, subject area, and problem orientation. Following this, behavioral objectives and suggested learning experiences are outlined. Behavioral objectives include cognitive and affective objectives and skills to be learned, while learning experiences list student-centered in-class activities and outside resource and community activities. Space is provided for teachers to note resource and reference materials--publications, audio-visual aids, and community resources. The guides are supplementary in nature and the lessons or episodes are designed to be placed in existing course content at appropriate times. This work was prepared under an ESEA Title III contract for Project I-C-E (Instruction-Curriculum-Environment). (BL)

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Project I - C - E INSTRUCTION - CURRICULUM - ENVIRONMENT

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A SUPPLEMENTARY PROGRAM FOR ENVIRONMENTAL EDUCATION

DISCIPLINE AREA Mathematics GRADE 7

Produced under Title III E.S.E.A.
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SE 016 546

PREFACE

"Oikus" for house is the Greek origin of the term "ecology". Environmental educati
tudies our house--whatever or wherever it may be. Like an umbrella, our house can
xpand or contract to fit many ranges--natural and man-made. We can add quality to o
nvirorments, our many "houses" if we omit rancor and cite long range gains, costs, a
omplexities. Our "oikus" uses the insights of all subjects. Thus, a rational, posi
ultidisciplinary program like ours necessarily results. Also, since attitudes grow
long time, our program ranges K thru 12. The environment mirrors our attitudes or
alues. These values have their origin in the "oikus" of our collective and individu
inds. Let us become masters of our house by replacing the Greek adage of "Know thys
ith "Know thyself and thine house."

. Written and designed by your fellow teachers, this guide is supplementary in natur
to fit appropriately into existing, logical course content.
. Each page or episode offers suggestions. Knowing your students best, you decide w
to adapt or adopt. Limitless chances are here for your experimentation and usage.
Many episodes are self contained, some open-minded, still others can be changed or
developed over a few days.
. Try these episodes, but please pre-plan. Why? Simply, no guide has all the answe
and no curriculum will work unless viewed in the context of your students.
. React to this guide with scratch ideas and notes on the episode pages.
. After using an episode, fill out the attached evaluation form in the back. Use,
duplicate, or request more of these forms. Send them singly or collectively to us
We sincerely want your reactions or suggestions--negative and positive. Your
evaluations are the key in telling us "what works" and in aiding our revisions of
the guides.

TERMS AND ABBREVIATIONS

ICE RMC is Project ICE Resource Materials Center serving all public and non-public
chool districts in CESA 3, 8, and 9. Check the Project ICE Bibliography of availabl
esources. Our address and phone number is on this guide's cover. Feel free to writ
r call us for any materials or help.

BAVI is Bureau of Audio Visual Instruction, 1327 University Avenue, P. O. Box 2093
adison, Wisconsin 53701 (Phone: 608-262-1644).

Cognitive means a measurable mental skill, ability, or process based on factual da

Affective refers to student attitudes, values, and feelings.

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Mary Wadzinski, How.-Suam.

ESEA Title III - 69-70-0135-2 Project I-C-E

CONCEPT 1

Energy from the sun, the basic source of all energy, is converted through plant photosynthesis into a form all living things can use for life processes.

Discipline Area: Mathematics

Subject: Proportion

Problem Orientation: Sunlight

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCE
Cognitive: The students will solve several problems in proportion to discover how the use of shadows on a sunny day will aid in obtaining the approximate height of tall objects. Affective: The students will become aware of how the sun's rays will be useful in estimating height.	II. Student-Centered in class activity A. A vertical object forms a right angle at its base with its shadow. A right triangle is formed if you think of an imaginary line from the tip of the shadow to the top of the object. The size of the angle formed at the tip of the shadow with the top of the object is the same for all vertical objects at the same time of day. Triangles thus formed are equal. Then the ratios of the corresponding sides of the triangles are equal. B. Given Problems: 1. Find the height of a tree that casts a shadow 12 feet long at the same time of day that a yardstick casts a shadow 1 foot long. The ratio of
Skills to be Learned: Use of ratio Use of yardsticks for making measurements The ideas of right angles and right triangles	

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sun, the basic

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otosynthesis into

g things can use for

Discipline Area Mathematics

Subject Proportion /

Problem Orientation Sunlight Grade 7

IVES	SUGGESTED LEARNING EXPERIENCES	
dents will ems in over how the sunny day ng the app- tall objects. dents will the sun's in estimat-	II. Student-Centered in class activity A. A vertical object forms a right angle at its base with its shadow. A right triangle is formed if you think of an imaginary line from the tip of the shadow to the top of the object. The size of the angle formed at the tip of the shadow with the top of the object is the same for all vertical objects at the same time of day. Triangles thus formed are equal. Then the ratios of the corresponding sides of the triangles are equal. B. Given Problems: 1. Find the height of a tree that casts a shadow 12 feet long at the same time of day that a yard-stick casts a shadow 1 foot long. The ratio of	II. Outside Resource and Community Activities A. Using ratio find the height of: 1. your church 2. your city water tower 3. yout school's flagpole 4. trees, basketball hoops playground equipment, etc. found near school or home.
d: or making angles and		

(continued on reverse side)

Resource and Reference Materials

Publications:

Darling, Lois, Place In The Sun - Ecology and the Living World, Morrow , 1968, $3.95

Reinow, Robert, Moment In The Sun (Report) Ballantine 1967, 95¢

Audio-Visual:

Community:

Continued and Additional Suggested Learni

I. (continued)

1. the shadow of the tree to the yard Then the height of the tree is 12 tim _____ feet.
2. Find the height of an electric lig a shadow 5 ft. long at the same time casts a shadow 2 ft. long.
3. Mark knows that he is 5 ft. 4 in. time that he casts a 16 in. shadow, H shadow. How tall is Harry?
4. When a vertical pole 20 ft. high c long, how tall is Jean? Who casts a
5. How high is a church spire that ca long at the same time that a yardstic ft. long?
6. When a tree casts a shadow 60 ft. casts a shadow 10 ft. long. How high
7. A 60 ft. flagstaff casts a shadow same time, how long a shadow will Jer feet tall?
8. Find the height of a building cast when a boy 5 feet tall casts a 2 foot
9. A tower casts a shadow 75 ft. long a pole 10 ft. high casts a shadow 6 f the height of the tower?
10. A telephone pole casts a shadow 30 same time a stick 5 ft. high casts a What is the height of the pole?

Materials	Continued and Additional Suggested Learning Experiences
e Sun - rld.	I. (continued)
The Sun 95¢	1. the shadow of the tree to the yardstick is 12 to 1. Then the height of the tree is 12 times the yardstick or _____ feet. 2. Find the height of an electric light pole that casts a shadow 5 ft. long at the same time that a 6 ft. pole casts a shadow 2 ft. long. 3. Mark knows that he is 5 ft. 4 in. tall. At the same time that he casts a 16 in. shadow, Harry casts a 12 in. shadow. How tall is Harry? 4. When a vertical pole 20 ft. high casts a shadow 15 ft. long, how tall is Jean? Who casts a 3 ft. long shadow? 5. How high is a church spire that casts a shadow 120 ft. long at the same time that a yardstick casts a shadow 6 ft. long? 6. When a tree casts a shadow 60 ft. long, a 9 ft. post casts a shadow 10 ft. long. How high is the tree? 7. A 60 ft. flagstaff casts a shadow 24 ft. long. At the same time, how long a shadow will Jerry cast if he is 5 feet tall? 8. Find the height of a building casting a 28 foot shadow when a boy 5 feet tall casts a 2 foot shadow. 9. A tower casts a shadow 75 ft. long at the same time a pole 10 ft. high casts a shadow 6 feet long. What is the height of the tower? 10. A telephone pole casts a shadow 30 feet long. At the same time a stick 5 ft. high casts a shadow 6 ft. long. What is the height of the pole?

ESEA Title III -59-70-0135-2 Project I-C-E

CONCEPT

2. All living organisms interact among themselves and their environment, forming an intricate unit called an ecosystem.

Discipline Area Mathematics

Subject Proportion,

Problem Orientation Wildlife Survival

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPE
Cognitive: The students, by corparison, will identify ways good conservation practices encourage wildlife production. Affective: The students will learn by participating in examples that will emphasize the value of conservation in saving wildlife. Skills to Be Learned: Read and Interpret facts Make Comparisons Problem Solving	I. Student-Centered in class activity Man is dependent on wildlife for food and pleasure. Wildlife depends on habits of man for his continued existence. When streams are polluted, natural habitat destroyed, and pesticides used thoughtlessly, wildlife becomes extinct. In 1968 there were 68 endangered species; in 1970 the number rose to 89; in 1971 - 102. A million acres of wildlife habitat was lost to agriculture in 1970, another million will be cleared in 1971. There are only 30 million acres in refuges out of the 2¼ billion acres in U.S. Happily, farmers are taking steps to turn the tide toward wildlife. The canvasback duck has declined 25% annually, the Cooper's hawk declined 25%, the California Condor 50% and the lovliest of (continued on reverse side)

ganisms interact

and their environ-

intricate unit

tem.

Discipline Area Mathematics

Subject Proportion, Area and Percent

Problem Orientation Wildlife Survival

Grade 7

ECTIVES	SUGGESTED LEARNING EXPERIENCES	
tudents, by identify ways practices e production. tudents will ating in l emphasize ervation in	I. Student-Centered in class activity Man is dependent on wildlife for food and pleasure. Wildlife depends on habits of man for his continued existence. When streams are polluted, natural habitat destroyed, and pesticides used thoughtlessly, wildlife becomes extinct. In 1968 there were 68 endangered species; in 1970 the number rose to 89; in 1971 - 102. A million acres of wildlife habitat was lost to agriculture in 1970, another million will be cleared in 1971. There are only 30 million acres in refuges out of the 2¼ billion acres in U.S. Happily, farmers are taking steps to turn the tide toward wildlife. The canvasback duck has declined 25% annually, the Cooper's hawk declined 25%, the California Condor 50% and the lovliest of (continued on reverse side)	II. Outside Resource and Community Activities A. Visit and explore a local tree farm. B. Visit a man-made pond. Observe what wildlife is evident about it. How is it protected from erosion, pollution and pesticides? C. Locate an area(nearby school or local situation) where a wildlife region could be set up. Form a committee to make plans to develop it.
ned: t facts		

Resource and Reference Materials

Publications:

National Wildlife Federation
E Q Index - 1971 - ICE - RMC

More Wildlife Through Soil And Water Conservation - 175
Soil Conservation Service
U.S. Department of Agriculture

Audio-Visual:

Our Endangered Wildlife,
51 minutes, color, Mc Graw - Hill Contemporary Films,
330 W. 42nd St., N.Y., N.Y. 10018

Continued and Additional Suggested Le

I. (continued)
our songbirds, the bluebird,is now c
rare". Our only hope is conservatio

A well-planned pond produces about 2
acre. We are stocking about 50,000
exceed 150,000 acres. At 85% of the
number of rabbits have been observed
quail at 55% and muskrats at 63%. T
wild ducks.

Windbreaks are being planted at the
per year. They provide cover for th
and song birds. Farmers are plantin
910,000 acres of trees annually. A
rabbits, grouse, and squirrels. "Od
rocky spots, sinkholes, old pits or f
been allowed to grow up into wildlif

A. Use this information to solve t

1. The endangered species of 196
than in 1970? This is an ave
how many a year? If this rat
many species would be listed

2. What part of the area of U.S.
refuge today?

3. If the canvasback duck is all
the given rate, in how many y
extinct? The California Cond

4. At the rate of 200 pounds of
production could we expect fro

(continued on next page)

erials Continued and Additional Suggested Learning Experiences

I. (continued)
our songbirds, the bluebird,is now considered the "most rare". Our only hope is conservation.

A well-planned pond produces about 200 pds. of fish per acre. We are stocking about 50,000 ponds a year. They exceed 150,000 acres. At 85% of these ponds a goodly number of rabbits have been observed, doves at 65%, quail at 55% and muskrats at 63%. They harbored 141,000 wild ducks.

Windbreaks are being planted at the rate of 4,000 miles per year. They provide cover for the ringnecked pheasant and song birds. Farmers are planting at the rate of 910,000 acres of trees annually. A good cover for deer, rabbits, grouse, and squirrels. "Odd Areas" such as rocky spots, sinkholes, old pits or fence corners, have been allowed to grow up into wildlife habitat.

A. Use this information to solve the following problems.

1. The endangered species of 1968 is how many less than in 1970? This is an average rate of about how many a year? If this rate continues, how many species would be listed by 1975?

2. What part of the area of U.S. is in wildlife refuge today?

3. If the canvasback duck is allowed to decline at the given rate, in how many years will it be extinct? The California Condor?

4. At the rate of 200 pounds of fish per acre, what production could we expect from the fish ponds

(continued on next page)

Continued and Additional Suggested Learning Experiences

I. (continued)

established yearly?

5. If 4,000 miles of windbreak are planted yearly, give the ratio for five years. Ten years.

6. Evergreen trees are planted 6 feet apart. How many trees are required for an acre? For 910,000 acres?

7. Given 20 rabbits spotted at each pond, how many rabbits could be expected in all the ponds (50,000) established in a year?

8. A female grouse usually lays 12 eggs. Of these ten successfully hatch. What part of the lay hatches? What would be the ratio for thirty females?

9. Student groups (4-5) will graph/chart the ratios calculated above for classroom display and impact.

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT 3. Environmental factors are limiting on the numbers of organisms living within their irfluence, thus, each environment has a carryi-g capacity.

Discipline Area Mathematics

Subject Basic Computatio

Problem Orientation Interdependen

BEHAVIORAL OLJECTIVES	SUGGESTED LEARNING EXPERIENCES
Cognitive: The students,by calculations, will interpret significantly how land use, food supply, and population growth are interrelated. Affective: The students will develop an appreciation of the values of careful stewardship of our natural environment.	I.Student-Centered in class activity A. During the 20 years from 1790 to 1810, the population of U.S. increased from 3,929,000 to 7,239,000. During the 20 years from 1950 to 1970 the population increased from 150,697,000 to 207,000,000. 1. What was the population increase from 1790 to 1810? 2. What was the increase from 1950 to 1970? 3. How much greater was the increase per year from 1950 to 1970 than from 1790 to 1810? 4. What was the average increase per year from 1950 to 1970? B. The average consumption of beef per capita is 106.6 pounds of carcass weight. 1. Using the facts in A, how
Skills to be Learned: An understanding of large Numbers Effective Reasoning An understanding of the great sacrifice interstate highways inflict on our amount of cropland.	

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carryi-g capacity.

Discipline Area Mathematics

Subject Basic Computation

Problem Orientation Interdependency Grade 7

CTIVES	SUGGESTED LEARNING EXPERIENCES	
nts, by nterpret nd use, ulation ted.	I. Student-Centered in class activity A. During the 20 years from 1790 to 1810, the population of U.S. increased from 3,929,000 to 7,239,000. During the 20 years from 1950 to 1970 the population increased from 150,697,000 to 207,000,000. 1. What was the population increase from 1790 to 1810? 2. What was the increase from 1950 to 1970? 3. How much greater was the increase per year from 1950 to 1970 than from 1790 to 1810? 4. What was the average increase per year from 1950 to 1970? B. The average consumption of beef per capita is 106.6 pounds of carcass weight. 1. Using the facts in A, how	II. Outside Resource and Community Activities A. Compare the population growth in your community from 1950 to 1970. B. Check highway construction areas in your area. Are they using wasteland or farmland? C. Will their construction disrupt wildlife? D. Interview a beef producer to learn facts to calculate the amount of hay, or grain an animal 1½ years old would consume. Sample Questions: 1. How much hay does a beef animal consume a day? 2. What grain is included in a beef animal's ration?
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the erstate our		

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Resource and Reference Materials	Continued and Additional Suggested Le
Publications: Pollution Problems and Projects, Wisconsin Department of Instruction, Madison, Wisconsin Wisconsin Survival Handbook, Wisconsin Environment Decade, Racine, Wisconsin Audio-Visual: Population Explosion, 43 minutes, Carousel Films, Inc., 1501 Broadway, N.Y., N.Y. 10035 Our Vanishing Land Mc Graw - Hill, Contemporary Films, 330 W. 42nd Street, N.Y., N.Y., 10018 Community: Highway Department Local Beef producer	I. (continued) many pounds of beef were con 2. If each animal weighs about were needed to produce the beef 3. If the projected consumption per person in 1980, and the pro 270 million, how many 1000 pound needed to supply it? 4. If each day, one of these an gallons of water, how many gall day? In the 1½ years of its li 5. If each animal in 1980 produc waste per day, then how many me will be produced in 1½ years? C. From 1963 to 1967, 28.6 square mi southwestern counties of Wisconsin we sprawl. Of this amount 19.7 square farmland. 1. What percent of the land lost farmland? 2. How many acres of cropland wa D. The interstate highway system uses land per mile of highway. 1. At this rate, how many acres used for the interstate highway Paul, a distance of 304 miles? E. At this rate of farmland loss, is American people going hungry in futur ulation and interstate highway growth II. (continued) In what proportion? 3. How many pounds of grain feed

ence Materials	Continued and Additional Suggested Learning Experiences
d Projects, of Instruction,	I. (continued) many pounds of beef were consumed in U.S. in 1970? 2. If each animal weighs about 1000 pounds, how many were needed to produce the beef needed back in 1970? 3. If the projected consumption of beef is 117 pounds per person in 1980, and the projected population is 270 million, how many 1000 pound animals will be needed to supply it? 4. If each day, one of these animals drinks 12 gallons of water, how many gallons will be used a day? In the 1½ years of its life? 5. If each animal in 1980 produced 23,600 grams of waste per day, then how many metric tons of waste will be produced in 1½ years?
ndbook, Decade,	
43 minutes, 1501 10035	C. From 1963 to 1967, 28.6 square miles of land in seven southwestern counties of Wisconsin were consumed by urban sprawl. Of this amount 19.7 square miles was productive farmland. 1. What percent of the land lost was productive farmland? 2. How many acres of cropland was this?
mporary Films, .Y., N.Y., 10018	D. The interstate highway system uses up 50 acres of cropland per mile of highway. 1. At this rate, how many acres of Wisconsin land was used for the interstate highway from Beloit to St. Paul, a distance of 304 miles?
	E. At this rate of farmland loss, is there any danger of American people going hungry in future years if our population and interstate highway growth continues at this rate?
	II. (continued) In what proportion? 3. How many pounds of grain feed is fed per day?

CONCEPT: 4. An adequate supply of pure water is essential for life.

Discipline Area: Mathe

Subject: Percent

Problem Orientation:

ESEA Title III - 59-70-0135-2 Project I-C-E

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPE
Cognitive: The students by means of a calculation will determine the uses and cost of water in our daily lives - in the home, in industry, in communication. Affective: The students will become aware of the many gallons of pure water necessary for normal living, and the need for conserving water.	I. Student-Centered in class Activity A. The average American uses 60 gallons of water per day in the home, in the following ways: flushing toilets 41% washing and bathing 37% kitchen use 6% Watering 3% Drinking 5% Washing clothes 4% General cleaning 3% Washing cars 1% 1. To the nearest whole number, how many gallons are used for each purpose? 2. How much would one person use in a week? Your family? How much in a year? B. To meet the needs of the average community, a water utility must supply 150 gallons of clean water per person/per day. Use the population of your community
Skills to be learned: The practical use of Percent Use of cubic measure Dependency of a community on its supply of pre water. Interpreting facts	

(continued on reverse side)

supply of pure

sential for life.

Discipline Area Mathematics

Subject Percentage and Whole Numbers

Problem Orientation Water Grade 7

CTIVES	SUGGESTED LEARNING EXPERIENCES	
tudents by means will determine of water in in the home, mmunication. udents will e many gallons ssary for the need for	I. Student-Centered in class Activity A. The average American uses 60 gallons of water per day in the home, in the following ways: flushing toilets 41% washing and bathing 37% kitchen use 6% Watering 3% Drinking 5% Washing clothes 4% General cleaning 3% Washing cars 1% 1. To the nearest whole number, how many gallons are used for each purpose? 2. How much would one person use in a week? Your family? How much in a year? B. To meet the needs of the average community, a water utility must supply 150 gallons of clean water per person/per day. Use the population of your community (continued on reverse side)	II. Outside Resource and Community Activities A. Obtain a copy of the water rates of your community. Figure the value of the water you use in a month. In a year. B. Weigh a dozen daily newspapers. In the paper, find the number of papers circulated daily. Using the information in problem "F", find the amount of water needed to produce one daily copy. C. Visit your community water supply. How is its purity insured? If you live in a rural area, how can you be sure your water is pure? D. Place a pan in the washbowl before you brush your teeth. Allow the water to run while you brush them. How much water did you use? How much could you have saved (continued on reverse side)
ed: e of Percent sure community on its water. ts		

Resource and Reference Materials	Continued and Additional Suggeste
Publications: Pollution: Problems, Projects, and Mathematics Exercises, Bulletin # 1082, Wisconsin Department of Public Instruction, 126 Langden St., Madison, Wisconsin 1971 EQ Index, I-C-E RMC Audio-Visual: Water Famine, Carousel Films, Inc. 1501 Broadway, N.Y., N.Y. 10035 Problem With Water is People, 30 minutes, color, Mc Graw - Hill Contemporary Films, 330 W. 42nd St. N.Y., N.Y. 10018 Community: City Water Department or Other Supply	I. (continued) to compute the amount of water water utility -- each day, eac year. C. The loss of water in the home minutes. How many gallons wou D. Commercial operations use abou per person. How many days are of water per person? E. If it required 1,400 gallons o of steel? F. The paper industry uses about 9 each ton of paper produced. 1. How many gallons does it tak paper? 2. If 53 million tons of paper how many gallons of water wo 3. There are 7½ gallons of wate many cubic feet of water was II. (continued) if you had used a glass of w save in a year?

Reference Materials	Continued and Additional Suggested Learning Experiences
blems, Projects, and rcises, Bulletin in Department of ion, 126 Langden St., sin I-C-E RMC rousel Films, Inc. .Y., N.Y. 10035 er is People, 30 Mc Graw - Hill ms, 330 W. 42nd St. 8 tment or Other	I. (continued) to compute the amount of water that must be produced by the water utility -- each day, each week, each month, each year. C. The loss of water in the home is ½ cubic foot in 15 minutes. How many gallons would be lost in a day? D. Commercial operations use about 20 gallons of water per day/ per person. How many days are needed to use 600 gallons of water per person? E. If it required 1,400 gallons of water to produce $50 worth of steel? F. The paper industry uses about 90,000 gallons of water for each ton of paper produced. 1. How many gallons does it take to produce one pound of paper? 2. If 53 million tons of paper is produced each year, then how many gallons of water would be used in a year? 3. There are 7½ gallons of water in a cubic foot. How many cubic feet of water was used in problem 2? II. (continued) if you had used a glass of water? How much would you save in a year?

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT 5. An adequate supply of clean air is essential because most organisms depend on oxygen, through respiration, to release the energy in their food.

Discipline Area Mathematics

Subject Basic Computa

Problem Orientation Air Pollu

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES
Cognitive: The pupil will be able to compute the amount of air pollutants created by transportation and its relation to respiratory diseases. Affective: The pupils will be conscious of the causes of air pollution in their community.	I. Student-Centered in Class Activity A. Causes: 1. A 1965 automobile of a certain make and model pollutes the air 5 times as much as a 1970 automobile of the same make and model. The 1965 auto started at the beginning of a section of highway traveling 50 mph at a steady rate. Two hours later the 1970 automobile started at the same place and traveled in the same direction at a steady rate of 65 mph. If the 1970 car pollutes the air at the rate of n cubic feet per hour, how many n cubic feet of pollutants were emitted by each car by the time the 1970 car caught up to the 1965 car? 2. In 1967, U.S, passenger cars totaled 80,414,000. They emitted 61,000,000 tons of carbon monoxide into the air. (continued on reverse side)
Skills to be Learned: Working verbal problems Review of Addition Subtraction Multiplication Division	II. Outsid Commun A. Make of cars at certa days in 1. Go have c travel and th in each hour d hour, rush h a midd 2. Whe you fe determi would each c 3 pass 3, Det the ca 2 pers than 3 (continue

supply of clean air is

use most organisms depend

ough respiration, to re-

gy in their food.

Discipline Area Mathematics

Subject Basic Computation

Problem Orientation Air Pollution Grade 7

ECTIVES	SUGGESTED LEARNING EXPERIENCES
pupil will ute the am- llutants sportation n to res- es. pupils will the causes n in their	I. Student-Centered in Class Activity A. Causes: 1. A 1965 automobile of a certain make and model pollutes the air 5 times as much as a 1970 automobile of the same make and model. The 1965 auto started at the beginning of a section of highway traveling 50 mph at a steady rate. Two hours later the 1970 automobile started at the same place and traveled in the same direction at a steady rate of 65 mph. If the 1970 car pollutes the air at the rate of n cubic feet per hour, how many n cubic feet of pollutants were emitted by each car by the time the 1970 car caught up to the 1965 car? 2. In 1967, U.S, passenger cars totaled 80,414,000. They emitted 61,000,000 tons of carbon monoxide into the air. (continued on reverse side)
arned: problems ion action plication ion	II. Outside Resource and Community Activities A. Make plans to take a count of cars traveling certain routes at certain hours, on various days in your community: 1. Go to the location you have chosen. Count the cars traveling in one direction and the number of passengers in each car. Do this for ½ hour during a morning rush hour, ½ hour during evening rush hour, and ½ hour during a midday hour, for one week. 2. When you arrive at what you feel is a fair sampling, determine how many fewer cars would have been needed if each car would have carried 3 passengers. 3, Determine what percent of the cars carried only 1 person 2 persons; 3 persons; more than 3 persons. (continued on page 4 of this lesson)

Resource and Reference Materials	Continued and Additional Suggested Lear
Publications: Pollution: Problems, Projects, and Mathematics Exercises, Bulletin # 1082, Wisconsin Department of Public Instruction, 126 Langden St., Madison, Wisconsin The Automobile and Air Pollution: A Program For Progress (Part I and II) , $1.00, Government Printing Office, 1967 Pamphlet - Air Pollution: The Facts Metro Clean Air Committee, 1892 Portland Ave., Minneapolis, Minn. 55404 **Audio-Visual:** Air Pollution: Take A Deep Deadly Breath, 3 parts, 54 minutes, color, free, Wisconsin Tuberculosis and Respiratory Disease Association, Publication Department, Box 424, Milwaukee, Wisconsin 53201 Poisoned Air, (discussion with auto and oil company, 50 minutes, Mc Graw Hill Contemporary Films, 330 W. 42nd Street, N.Y., N.Y. 10018 **Community:**	I. Student-Centered in class activity (co a) On an average, each car was ting how much carbon monoxide i b) At that rate, 1 person drivi would have caused how much carb lute the air? Using the following statistics, a questions for these chemicals: Hydrocarbons 16,000,000 tons Nitrogen Oxides 6,000,000 tons Lead 210,000 tons 3. A 1965 automobile emits an averag million of hydrocarbons in its ex air. A 1970 automobile emits a c parts per million. About how man take to pollute the air with hydr one 1965 auto. 4. At the time of takeoff, a four-en pounds of air pollutants. If suc every minute from an airport how lutants are poured out into the a day? In 1 week? In 1 month (30 Convert all these answers to tons. B. Results: 1. When the sulfur dioxide content o rises above 0.2 parts per million, t a result. In the five years, 1965 t reached this level once every ten da a. What was the minimum number of N.Y. City during the five years, result of air pollution by sulfur (continued on next page)

Materials	Continued and Additional Suggested Learning Experiences
ojects, s, Bulletin ment of Langden St.,	I. Student-Centered in class activity (continued) a) On an average, each car was responsible for emitting how much carbon monoxide into the air? b) At that rate, 1 person driving a car for 50 years would have caused how much carbon monoxide to pollute the air? Using the following statistics, answer the same two questions for these chemicals: Hydrocarbons 16,000,000 tons in 1967 Nitrogen Oxides 6,000,000 tons in 1967 Lead 210,000 tons in 1967
ollution: (Part I and Printing	
: The Facts e, 1892 is, Minn.	3. A 1965 automobile emits an average of 900 parts per million of hydrocarbons in its exhause to pollute the air. A 1970 automobile emits a corresponding 180 parts per million. About how many 1970 autos does it take to pollute the air with hydrocarbons as much as one 1965 auto.
eep Deadly tes, color, osis and ciation, Box 424, 201	4. At the time of takeoff, a four-engine jet pours out 88 pounds of air pollutants. If such a plane takes off every minute from an airport how many pounds of pollutants are poured out into the air in 1 hour? In 1 day? In 1 week? In 1 month (30 days)? In 1 year? Convert all these answers to tons.
n with auto tes, Mc Graw 330 W. 10018	B. Results: 1. When the sulfur dioxide content of the air in N.Y. City rises above 0.2 parts per million, ten to 20 people die as a result. In the five years, 1965 to 1970, sulfur dioxide reached this level once every ten days. a. What was the minimum number of people who died in N.Y. City during the five years, 1965 to 1970, as a result of air pollution by sulfur dioxide? (continued on next page)

I. Student-Centered in Class Activity (continued)

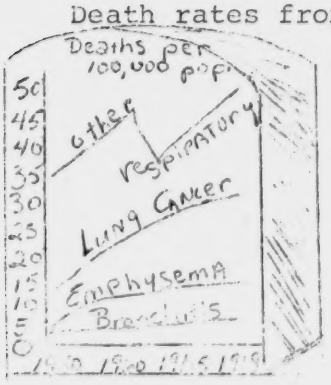
b. What was the maximum number of people who died in New York City d
years, 1965 to 1970, as a result of air pollution by sulfur dioxide?

2. Aggravated by air pollutants, emphysema is the fastest growing cause
country today. In the ten-year period from 1950 through 1959, deatl
from emphysema rose from 1.5 per hundred thousand to 8 per hundred
total has increased steadily. In 1970, the population of the Unite
203 million, and 50,000 persons died from emphysema, How many peop
thousand died from emphysema?

3. In 1949, New York City had the most polluted air and the highest dea
pneumonia in the state of New York -- 31.5 per 100,000 population.
cities with much cleaner air, the rate was only 23.9 per 100,000.
where pollution was least, the death rate was lower still -- 16.9
rates increased. Then New York City had 50.6 pneumonia deaths per
upstate cities had 38.6 and the rural areas had 29.2.
a. What was the rate of increase in New York City from 1949 to 1959
b. How much higher was the rate in New York City than the rural area

4. <u>Air Pollution Kills</u>

Death rates from diseases associated with air are climbing.



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National Wildlife Federation
1971 EQ Index
1412 16th Street, N.W.
Washington, D.C. 20036

(continued o

nued and Additional Suggested Learning Experiences

Class Activity (continued)

e maximum number of people who died in New York City during the five
1970, as a result of air pollution by sulfur dioxide?

air pollutants, emphysema is the fastest growing cause of death in our
In the ten-year period from 1950 through 1959, deaths among males
rose from 1.5 per hundred thousand to 8 per hundred thousand. This
eased steadily. In 1970, the population of the United States was
nd 50,000 persons died from emphysema, How many people per hundred
from emphysema?

ork City had the most polluted air and the highest death rate from
he state of New York -- 31.5 per 100,000 population. In eleven upstate
ch cleaner air, the rate was only 23.9 per 100,000. In rural areas,
n was least, the death rate was lower still -- 16.9 In 1959, all
d. Then New York City had 50.6 pneumonia deaths per 100,000; the
had 38.6 and the rural areas had 29.2.
e rate of increase in New York City from 1949 to 1959?
gher was the rate in New York City than the rural areas in 1949?

Kills

from diseases associated with air are climbing.

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1971 EQ Index
1412 16th Street, N.W.
Washington, D.C. 20036

(continued on next page)

Continued and Additional Suggested Learning E

II. Outside Resource and Community Activities (continued)

4. What conclusions can you form as an individual or as project? Can you use these conclusions to make some rec family (families) ? To the staff of your school? To th To your traffic department?

WHO, WHAT, WHERE, WHY AND HOW OF AIR POLLUTION *n

Pollutant	Main Source	Effect on Health	Minimum Standards
1. Sulfur Oxide	Electric plants	a. Irritates respiratory tract b. Damage lungs	80 micrograms/cu. m. as the annual mean
2. Particulates	Smoke, Soot, fly ash, Power plant	a. Damage lungs b. Cause gastric cancer	75 micrograms/cu. m.
3. Carbon Monoxide	Autos, trucks, Buses	a. Slows reactions b. Damages heart	9 parts/million, maximum 8-hr. concentration once a year
4. Hydrocarbons	Refineries and Automobiles	Not toxic, but contribute to smog	0.24 parts/million maximum in 3 y once a year

(continued on next page of this lesson)

Continued and Additional Suggested Learning Experiences

source and Community Activities (continued)

conclusions can you form as an individual or as a group carrying out this ? Can you use these conclusions to make some recommendations to your own (families) ? To the staff of your school? To the members of your community? traffic department?

HO, WHAT, WHERE, WHY AND HOW OF AIR POLLUTION *note at bottom of page 5 (next Page)

Main Source	Effect on Health	Minimum Standards	EPA's Recommended Action
Electric plants	a. Irritates respiratory tract b. Damage lungs	80 micrograms / cu. m. as the annual mean	Shift to natural gas.
Smoke, Soot, fly ash, Power plant	a. Damage lungs b. Cause gastric cancer	75 micrograms / cu. m.	Burn cleaner fuel
Autos, trucks, Buses	a. Slows reactions b. Damages heart	9 parts/million, maximum 8-hr. concentration once a year	New devices for auto engines; limit traffic in some cities
Refineries and Automobiles	Not toxic, but contribute to smog	0.24 parts/million maximum in 3 yrs. once a year	Automobiles must reduce hydrocarbon emission by more than 90% by 1975

(continued on next page of this lesson)

WHO, WHAT, WHERE, WHY AND HOW OF AIR POLLUTION (continued)

Pollutant	Main Source	Effect on Health	Minimum Standards	E
5. Nitrogen Oxides	High-temperature combustion in engines, furnaces	Increase susceptibility to influenza	0.05 parts/ million as the annual mean	Aut nit 19 19
6. Photochemical-Oxidants	Sunlight on hydrocarbons and nitrogen oxides from engines, furnaces	a. Irritate eyes b. Increase asthma attacks	0.08 parts/ million maximum 1 hr. concentration each year	New hel pro

*NOTE: Environmental Protection Agency has prepared tough air qualit based on public health values. States have until end of Janu submit plans for meeting them. But final deadline for meetin dards is July 1, 1975.

Above table taken f Federation, 1971 E

WHAT, WHERE, WHY AND HOW OF AIR POLLUTION (continued)

Main Source	Effect on Health	Minimum Standards	EPA's Recommended Action
gh-temperature mbustion in gines, furnaces	Increase susceptibility to influenza	0.05 parts/ million as the annual mean	Autos must start reducing nitrogen oxide emission by 1973; reducing to 90% by 1976
nlight on drocarbons and trogen oxides om engines, rnaces	a. Irritate eyes b. Increase asthma attacks	0.08 parts/ million maximum 1 hr. concentration each year	New Auto Standards will help; change industrial processes

onmental Protection Agency has prepared tough air quality standards, on public health values. States have until end of January 1972 to t plans for meeting them. But final deadline for meeting all stan- is July 1, 1975.

Above table taken from: National Wildlife Federation, 1971 EQ Index , pg. 6

CONCEPT 6. Natural resources are not equally distributed over the earth or over time and greatly affect the geographic conditions and quality of life.

Discipline Area Mathematics

Subject Measurement and

Problem Orientation Supply and Demand of W

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES
Cognitive: The student will calculate the nations' average electrical needs and estimate the average cost per month, per year. Affective: The student will see the significance of water control for man's survival in his environment.	I. Student-Centered in class Activity A. Worksheet: Cost of Electricity (see attached sheet) B. The follow-up (of worksheet) will be the amount of water needed to handle the given amounts of electricity and is there a supply of H_2O to avoid black-outs, restricted use of appliances, etc. C. Research and compute the total amount of electricity used by air conditioners during the summer compared to the amount used by electrical heaters during the winter.
Skills to be Learned: Data gathering Finding averages Rounding numbers	

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B. I
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and quality of life.

Discipline Area Mathematics

Subject Measurement and Basic Computation

Problem Orientation Supply and Demand of Water

Grade 7

	SUGGESTED LEARNING EXPERIENCES	
will aver- i st will wa- ur- t.	I. Student-Centered in class Activity A. Worksheet: Cost of Electricity (see attached sheet) B. The follow-up (of worksheet) will be the amount of water needed to handle the given amounts of electricity and is there a supply of H_2O to avoid black-outs, restricted use of appliances, etc. C. Research and compute the total amount of electricity used by air conditioners during the summer compared to the amount used by electrical heaters during the winter.	II. Outside Resource and Community Activities A. The students can study their own community, its rise of electricity and its cost per family and per person. B. Is there sufficient water resources to handle all their community's needs today? next year? Ten years?

Resource and Reference Materials	Continued and Additional Suggested
Publications: Overman, Michael, Water: Solutions To A Problem Of Supply And Demand, Doubleday Science Series, 628.1, 1969, paperback $2.45 Helfman, Elizabeth, Rivers and Watersheds in America's Future, McKay, 1965, $4.95 (333.72) Audio-Visual: Clean Waters, (20 minutes), National Medical Audio-Visual Center Chamblee, Georgia 30005 Problem with Water is People, 30 minutes, color on request, Mc Graw-Hill Contemporary Films, 330 W. 42nd Street, N.Y., N.Y. 10018 Community: Electric Power Company City Hall DNR	

terials	Continued and Additional Suggested Learning Experiences
olutions Demand, 628.1,	
and Water- McKay,	
al Center	
e, 30 Mc Graw- 30 W. 0018	

Numbers in the News

Subject: Cost of Electricity

The Edison Electric Institute has released information regarding the cost of electricity for various home appliances. The cost does vary depending upon the area; however, the national average is about $.021 per kilowatt hour. The information below is based on an average family and the $.021 average cost per *kilowatt hour.

Appliance	Average Kilowatt Hours Used Per Year	AVG. annual Cost	AVG. cost Per Month
Hot Water Heater	4,219	$88.60	$7.38
Refrigerator-Freezer (14 cubic ft.- frostless)	1,829	(A) 38.41	(B) 3.19/3.20
Electric Range	1,175	(C) 24.68	(D) 2.06
Clothes Dryer	993	(E) 20.85	(F) 1.74
Television Set			
Black and White	362	(G) 7.60	(H) .63
Color	502	(I) 10.54	(J) .88
Dishwasher	363	(K) 7.62	(L) .64/.65
Iron	144	(M) 3.02	(N) .25
Coffee Maker	106	(O) 2.23	(P) .19
Automatic Washer	103	(Q) 2.16	(R) .18/.19
Radio	86	(S) 1.81	(T) .15
Vacuum Cleaner	48	(U) 1.01	(V) .08
Toaster	39	(W) .82	(X) .07/.06

*The term "kilowatt" is from the prefix "kilo" meaning thousand and the word "watt" which is a measurement of electrical power. A kilowatt, then, is a thousand watts. A "kilowatt hour" is the amount of electricity used by one 100 watt bulb that burns for ten hours.

COMPUTE TO NEAREST CENT

1. What are the totals for the following food equipment appliances? (refrigerator, range, coffee maker, dishwasher, toaster)
Kilowatt hours: 3512 Cost per year: $73.75 Cost per month $6.15 or 6.16

2. What are the totals for the following cleaning equipment? (clothes dryer, automatic washer, vacuum cleaner)
Kilowatt hours: 1144 Cost per year: $24.02 Cost per month: $2.00

(14 cubic ft.- frostless)	1,829	(A) 38.41	(B) 3.19/3.20
Electric Range	1,175	(C) 24.68	(D) 2.06
Clothes Dryer	993	(E) 20.85	(F) 1.74
Television Set			
Black and White	362	(G) 7.60	(H) .63
Color	502	(I) 10.54	(J) .88
Dishwasher	363	(K) 7.62	(L) .64/.65
Iron	144	(M) 3.02	(N) .25
Coffee Maker	106	(O) 2.23	(P) .19
Automatic Washer	103	(Q) 2.16	(R) .18/.19
Radio	86	(S) 1.81	(T) .15
Vacuum Cleaner	48	(U) 1.01	(V) .08
Toaster	39	(W) .82	(X) .07/.06

*The term "kilowatt" is from the prefix "kilo" meaning thousand and the word "watt" which is a measurement of electrical power. A kilowatt then, is a thousand watts. A "kilowatt hour" is the amount of electricity used by one 100 watt bulb that burns for ten hours.

COMPUTE TO NEAREST CENT

1. What are the totals for the following food equipment appliances? (refrigerator, range, coffee maker, dishwasher, toaster)
Kilowatt hours: 3512 Cost per year: $73.75 Cost per month $6.15 or 6.16

2. What are the totals for the following cleaning equipment? (clothes dryer, automatic washer, vacuum cleaner)
Kilowatt hours: 1144 Cost per year: $24.02 Cost per month: $2.00

3. How much more does it cost for electricity for a color T.V. set than a black and white set for one year? $2.94

4. What would be the appliance portion of the electric bill for one month for a family with all appliances listed above? (Include one color T.V. set and no black and white T.V. set) $16.82

5. What would the cost total to operate the following for six hours: four 150 watt bulbs, three 100 watt bulbs, one 60 watt bulb, and one 40 watt bulb? $ .126 or 12.6¢

6. What would be the electric light bill for one month (30 days) assuming the same amount of electric light usage per day as listed in problem #5. $3.78

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CONCEPT

7. Factors such as facilitating transportation, economic conditions, population growth, and increased leisure time have a great influence on changes in land use and centers of population density.

Discipline Area Mathematics

Subject Graphs

Problem Orientation Population

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES
Cognitive: The student will compare the growth of America over the last century by constructing and reading graphs. Affective: The students will be alerted to the rapid growth of their nation, and its impact on food, housing and educational problems. Skills to be learned: Types of graphs Graph Construction Locating Statistics	I. Student-Centered in class activity A. Use a bar graph to show the population growth (by 10 year periods) starting 1870 to present. The data for the graph may be obtained from the Bureau of Census, Blue Books, Encyclopedias, etc. Suggest assigning a student or groups of students to write for the information from the Bureau or most of the data should be obtainable from the community (school) library. B. Use a line graph to show the growth in wheat production (in bushels) over the same period of years. C. Use a pictorial graph to show the immigration of people within the U.S. in the last 30 years. D. Show by the use of a graph,

(continued on reverse side)

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influence on changes in land
population density.

Discipline Area Mathematics

Subject Graphs

Problem Orientation Population Growth Grade 7

TIVES	SUGGESTED LEARNING EXPERIENCES
ent will f America y by con- g graphs. ents will pid growth its ing and . :	I. Student-Centered in class activity A. Use a bar graph to show the population growth (by 10 year periods) starting 1870 to present. The data for the graph may be obtained from the Bureau of Census, Blue Books, Encyclopedias, etc. Suggest assigning a student or groups of students to write for the information from the Bureau or most of the data should be obtainable from the community (school) library. B. Use a line graph to show the growth in wheat production (in bushels) over the same period of years. C. Use a pictorial graph to show the immigration of people within the U.S. in the last 30 years. D. Show by the use of a graph,

(continued on reverse side)

II. Outside Resource and Community Activities

A. Graph the growth of your community in the last 100 years.

B. Visit the ASC office to learn the agricultural trend in your own community.
1. How many farms are in the area now? 5 years ago? 10 years ago? 100 years ago?
2. How much land is used for agriculture compared to family and commercial living

C. How has the cost of education affected local taxes? (Graph)

D. Use Social Studies or History teacher as an additional resource.

E. Contrast the growth of the (U.S.) nation to your own community by interpretations of the graphs in parts I(A) and II(A).

Resource and Reference Materials	Continued and Additional Suggested Lear
Publications: Bureau of Census (Reports) Encyclopedias *Pollution; Problems, Projects and Mathematics Exercises (Grades 6-9) Wisconsin Department of Public Instruction, #0182, 126 Langden, Madison, Wisconsin, Suggested: Lesson 4, pg. 27 Lesson 5, pgs. 9-10 Lesson 8, pg. 13 Lesson 7, pg. 30 (comparison to another country India) *NOTE: Every school in the state of Wisconsin was issued a copy of this paper bound book. Audio-Visual: Community: Library City (Town) Clerk	I. (continued) the decrease in the number of pe in farming since 1940 E. How have the trends (A-D) affect systems ?

	Continued and Additional Suggested Learning Experiences
	I. (continued) the decrease in the number of people engaged in farming since 1940 E. How have the trends (A-D) affected the educational systems ?

ESEA Title III -59-70-0135-2 Project I-C-E

CONCEPT

8. Cultural, economic, social and political factors determine the status of man's values and attitudes toward his environment.

Discipline Area Math

Subject Basi

Problem Orientation

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIE
Cognitive: The students will demonstrate the high cost of air and water pollution, as compared to the low cost for a community cleanup program, by solving simple problems. Affective: The students will appreciate the fact that polluted air is not good for people, not necessary for progress, and that everyone has a right to breathe clean air.	I. Student-Centered in class activity A. Some people say that the cost to clean up our nations air and water will be too high. The National Wildlife Federation has studied the problem and provided these statistics: Air pollution damage in 1972 will amount to $16.1 billion or an average of $368 per family. Water pollution damage in 1972 will be $12.8 billion or an average of $213 per family. An air cleanup program would reduce annual air pollution damage to $90 per family by 1976. A water cleanup program would reduce annual water pollution damage to $21 per family by 1980. The annual cost of the air cleanup program would be $65 per family and the water cleanup program would be $105 per family. Compute the following:
Skills to be learned: An understanding of the term "net" in net annual savings Basic Subtraction and Addition Percent Average and Comparing Numbers	(continued on the reverse side)

ic, social and

etermine the status

attitudes toward

Discipline Area Mathematics

Subject Basic Computation

Problem Orientation Pollution Costs Grade 7

TIVES	SUGGESTED LEARNING EXPERIENCES	
nts will cost of on, as ost up imple	I. Student-Centered in class activity A. Some people say that the cost to clean up our nations air and water will be too high. The National Wildlife Federation has studied the problem and provided these statistics: Air pollution damage in 1972 will amount to $16.1 billion or an average of $368 per family. Water pollution damage in 1972 will be $12.8 billion or an average of $213 per family. An air cleanup program would reduce annual air pollution damage to $90 per family by 1976. A water cleanup program would reduce annual water pollution damage to $21 per family by 1980. The annual cost of the air cleanup program would be $65 per family and the water cleanup program would be $105 per family. Compute the following:	II. Outside Resource and Community Activities A. How would you classify your community's air and water? B. List the industries located in your community. Check those that you feel have taken steps to preserve clean air. What steps could be taken by the others to help clean up the air? C. How is the waste being cared for? Is it being discharged into the local waters? Is it being burned, thus polluting the air? D. What could you suggest to your local authorities to improve conditions in your community? E. Visit your local sewage
nts will hat pol- for for veryone e clean		
he annual		
g Numbers	(continued on the reverse side)	(continued on next page)

Resource and Reference Materials	Continued and Additional Suggested Learn
Publications: Hidden Savings From Cleaner America, Audubon, March 1972, National Wildlife Federation Audio-Visual: Poisoned Air, 50 minutes, Carousel Films,Inc., 1501 Broadway, N.Y., N.Y. 10035 #0678 Air Pollution, color, 11 minutes, 1968, B.A.V.I. Community: Sanitation Engineer Director of Public Works	I. (continued) 1. What is the water and air pollution 1972? 2. What would be the savings in annual per family by 1976? 3. What would be the net annual saving 1976? 4. What would be the net annual saving 1980? 5. What would be the net annual saving by 1980? 6. What would be the annual cost of cl water? 7. Ho much would the amount of air and per family (per year) be reduced by 19 8. What would be the annual (air and w savings per family by 1980? 9. How much would be invested by the a air and water cleanup program between years). 10. The National Wildlife Federation e that the amount computed in problem 9 between 1975 and 1979. (four years) H be recovered per year between 1975 and 11. By what percentage is it estimated aif pollution damage can be reduced by damage? B. The Council on Enviornmental Quality air causes damage to human health tha yearly, damage to materials and veget yearly, lowering of property values i What is the total cost? (continued on next page)

erials	Continued and Additional Suggested Learning Experiences
72, n	I. (continued) 1. What is the water and air pollution damage per family in 1972? 2. What would be the savings in annual air pollution damage per family by 1976? 3. What would be the net annual savings in air pollution by 1976? 4. What would be the net annual savings in air pollution by 1980? 5. What would be the net annual savings in water pollution by 1980?
rousel .Y., 11	6. What would be the annual cost of cleaning up the air and water? 7. Ho much would the amount of air and water pollution damage per family (per year) be reduced by 1980? 8. What would be the annual (air and water) pollution damage savings per family by 1980? 9. How much would be invested by the average family in an air and water cleanup program between now and 1975? (three years). 10. The National Wildlife Federation estimates, however, that the amount computed in problem 9 would be recovered between 1975 and 1979. (four years) How much money would be recovered per year between 1975 and 1979? 11. By what percentage is it estimated that the cost of aif pollution damage can be reduced by 1976? Water pollution damage?
	B. The Council on Enviornmental Quality reports that polluted air causes damage to human health that costs $6 billion yearly, damage to materials and vegetation is $4.9 billion yearly, lowering of property values is $5.2 billion yearly. What is the total cost?

(continued on next page)

Continued and Additional Suggested Learning Experiences

I. (continued)

C. In a study of two communities, one with clean air and one with pollut air, the cost of maintaining the family home and personal cleanliness wa $84 more per year in the dirty air community. What would be the extra yearly cost in a dirty community for the families in your class?

II. (continued)

E. system and ask them to explain its waste disposal operations to you.

F. Library research

CONCEPT 9. Man has the ability to manage, manipulate, and change his environment.

Discipline Area Mathematics

Subject Percent

Problem Orientation Soil Erosio

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
Cognitive: Students will identify the advantages of strip-cropping and reforestation of hillsides. Affective: Students, by observation, will locate areas in their community where soil conservation should be practiced. Skills to be Learned: Measurement Percent	I. Student-Centered in class Activity A. Experiment: 1. Prepare an ordinary cookie sheet, one of cultivated soil and one of sod (each 7" high) 2. Weigh them. Then measure various amounts of water in jars to represent a hard rain and an easy rain. Pour over each. 3. Catch the run-off. 4. Figure the percent of soil in each catch basin and the amount of water lost. Weigh pans again. B. The average depth of topsoil is 7 inches. An acre of topsoil of this depth weighs about 1,000 tons. Using the information provided in TABLE I on the reverse side, what percent of the soil was washed away where there were no trees? C. A field loses .5 ton of top- (continued on reverse side)	II. Outside Communi A. Invite explain h soil and pollution B. Take a reforesta cropping. C. Locate needs to D. Visit Conservat E. Scienc Science,

ESEA Title III - 59-70-0135-2 Project I-C-E

ty to manage, Discipline Area Mathematics

ge his Subject Percent

Problem Orientation Soil Erosion Grade 7

TIVES	SUGGESTED LEARNING EXPERIENCES	
will ges of efores- , by cate nity ion	I. Student-Centered in class Activity A. Experiment: 1. Prepare an ordinary cookie sheet, one of cultivated soil and one of sod (each 7" high) 2. Weigh them. Then measure various amounts of water in jars to represent a hard rain and an easy rain. Pour over each. 3. Catch the run-off. 4. Figure the percent of soil in each catch basin and the amount of water lost. Weigh pans again. B. The average depth of topsoil is 7 inches. An acre of topsoil of this depth weighs about 1,000 tons. Using the information provided in TABLE I on the reverse side, what percent of the soil was washed away where there were no trees? C. A field loses .5 ton of top-	II. Outside Resource and Community Activities A. Invite a farmer in to explain how he is conserving soil and thus, preventing pollution to streams. B. Take a field trip to study reforestation and strip-cropping. C. Locate areas where erosion needs to be stopped. D. Visit by local County Soil Conservation Agent. E. Science Teacher (Physical Science, Geology)

(continued on reverse side)

Resource and Reference Materials

Publications:

Water Use: Principles and Guidelines for Planning and Management in Wisconsin, Soil Conservation Society of America, 1969, I-C-E RMC #140-SO

SCSA Conservogram, Soil Conservation Society of America, Winter 1970, I-C-E RMC, #VF

Audio-Visual:

Film # 7085, Soil Makers, $6.50 1966, BAVI

Film # 0467, Conservation of Natural Resources, $2, 1937, BAVI

Film # 5079, Conserving Soil Today, $2.25, 1960, BAVI

Community:

County Agricultural Agent
Farmer
County Soil Agent

Continued and Additional Suggested Le

I. (continued)

C. soil planted to grass and 10 tons o to corn. The loss in corn is how many planted to grass?

D. Land available per person in the fol

Italy	0.7 acres
England	0.3 acres
Sweden	1.5 acres
France	1.2 acres
Belgium	0.3 acres
United States	2.5 acres

Each amount is what percent of the l the U.S.

E. Explain why many people suffer from European and Asian lands?

TABLE I

27 Inch Rainfall

	Forested Land	Eroded Land
Water Runoff	½%	62%
Erosion	NONE	34 Tons of Topsoil per acre

rence Materials	Continued and Additional Suggested Learning Experiences
es and Guide- nd Management onservation 1969, I-C-E	I. (continued) C. soil planted to grass and 10 tons of soil planted to corn. The loss in corn is how many times as much as planted to grass? D. Land available per person in the following countries is: Italy 0.7 acres England 0.3 acres Sweden 1.5 acres France 1.2 acres Belgium 0.3 acres United States 2.5 acres Each amount is what percent of the land available in the U.S. E. Explain why many people suffer from malnutrition in European and Asian lands?
oil Conser- nerica, RMC, #VF	
akers, \$6.50	
vation of 2, 1937, BAVI	
ving Soil BAVI	
Agent	

TABLE I

27 Inch Rainfall

	Forested Land	Eroded Land
Water Runoff	½%	62%
Erosion	NONE	34 Tons of Topsoil per acre

ESEA Title III - 59-70-1035-2 Project I-C-E

CONCEPT

10. Short-term economic gains may produce long-term environmental losses.

Discipline Area

Subject

Problem Orienta

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
Cognitive: By conducting measurement, the students will compute the amount of land (at school and home) covered by concrete, asphalt or gravel. Affective: The students will become aware of the amount of land required to support modern man in contrast to the amount available for recreational needs.	I. Student-Centered in class Activity A. How much concrete, asphalt or gravel covers the lot where you live? (buildings, patio, driveway, etc.) 1. Compute the area in squa feet. 2. Compute the percent of area covered by concrete, asphalt,gravel for each of the class members' individu lots. 3. Determine the average fo your class. B. Based on the class average what would be your prediction for the community?
Skills to be Learned: Area formulas Percent Averaging Map reading	

gains

rm

s.

Discipline Area Mathematics

Subject Area, Volume, Ratio & Proportion

Problem Orientation Land Use & Recreation Grade 7

S	SUGGESTED LEARNING EXPERIENCES	
g s. of) al ___	I. Student-Centered in class Activity A. How much concrete, asphalt or gravel covers the lot where you live? (buildings, patio, driveway, etc.) 1. Compute the area in square feet. 2. Compute the percent of area covered by concrete, asphalt,gravel for each of the class members' individual lots. 3. Determine the average for your class. B. Based on the class average, what would be your prediction for the community?	II. Outside Resource and Community Activities A. Use the city maps and the City Engineer (if available): 1. To show the percent of concrete, asphalt or gravel covers for the community (or neighborhood). 2. Compare the amounts of industrial cover to recreational cover (sites) 3. Compare the amounts of residential cover to industrial cover. 4. Compare the amount of residential sites to recreational sites. B. Using the figure from part A, is your community providing enough recreational space for its residents? (General information about the amount of adequate space may be obtained from the city Recreation Department). (continued on reverse side)

Resource and Reference Materials

Publications:

Pollution: Problems, Projects and Mathematics Exercises, #0182, Wisconsin Department of Public Instruction, Madison, Wisconsin

Audio-Visual:

#3849 Expanding City, 15 minutes University of Wisconsin, 1956 B.A.V.I.

#6429 Bulldozed America, 25 minutes, Carousel, 1965, B.A.V.I.

#250 Man at Bay, I-C-E RMC

Community:

City Engineer
City Recreation Department
City Clerk (to obtain accurate maps of city)

Continued and Additional Suggested

II. (continued)

C. Was the prediction of Pa with Part II?

ce Materials	Continued and Additional Suggested Learning Experiences

bjects
s, #0182,
Public
sconsin

5 minutes
1956

, 25
B.A.V.I.

RMC

nt
curate

II. (continued)

C. Was the prediction of Part I, B conclusive with Part II?

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT

11. Individual acts, duplicated or compounded, produce significant environmental alterations over time.

Discipline Area Mathematics

Subject Percent and G

Problem Orientation Forest Fir

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
Cognitive: By using percent data supplied, the students will calculate what groups of people cause the most forest fires. Affective: The students will become aware of the causes of forest fires and how much forest land is destroyed by forest fires. Skills to be Learned: Statistics Interpreting Data Circle Graphing Comparing Numbers	I. Student-Centered in class Activity A. For data to answer the following questions, see TABLE I on the reverse side. 1. What single group was most responsible for forest fires? 2. What single factor was least responsible for forest fires? 3. In which of the classes of people did the number of fires decreased from 1967 to 1968? 4. Compare the fires caused by the hunter in 1967 to 1968. a. Was it an increase or a decrease? b. The decrease is what percent of the original number? 5. The fires caused by the local resident is how (continued on reverse side)	II. Outside Res Community A A. Ask a For to the class 1. The nu local ter 2. The ma their are 3. The ac fires is 4. The me fighting B. County So or Agricultu

, duplicated or compounded,
ant environmental
time.

Discipline Area Mathematics

Subject Percent and Graphing

Problem Orientation Forest Fires Grade 7

TIVES	SUGGESTED LEARNING EXPERIENCES	
ng percent e students t groups e most students of the fires and nd is st fires. ned:	I. Student-Centered in class Activity A. For data to answer the following questions, see TABLE I on the reverse side. 1. What single group was most responsible for forest fires? 2. What single factor was least responsible for forest fires? 3. In which of the classes of people did the number of fires decreased from 1967 to 1968? 4. Compare the fires caused by the hunter in 1967 to 1968. a. Was it an increase or a decrease? b. The decrease is what percent of the original number? 5. The fires caused by the local resident is how (continued on reverse side)	II. Outside Resource and Community Activities A. Ask a Forest Ranger to speak to the class. Questions: 1. The number of fires in the local territory is _____? 2. The main causes of fires in their area is _____? 3. The acreage lost due to fires is _____? 4. The methods used in fire fighting are _____? B. County Soil Conservationist or Agricultural Agent

Resource and Reference Materials	Continued and Additional Suggested Learn

Publications:

1967-69 Biennial Report, Department of Natural Resources, State of Wisconsin

Audio-Visual:

Forest Conservation, 11 minutes, color, Encyclopedia Britannica Educational Corp., 425 North Michigan Avenue, Chicago, Illinois 60611

Wasted Woods, Association Films, 600 Grand Ave., Ridgefield, N.J. 07657

Community:

Forest Ranger
Conservation Department
County Forester

I. (continued)

5. many times greater than the fires transients (to the nearest tenth)

6. Construct a circle graph of the 19 data showing those people responsible fo include the non-man made forest fires.

TABLE I

NUMBER OF FIRES BY CLASS OF PEOPL

Class of People	1967	
	No.	%
Local Resident	889	41.2
Transient	159	7.4
Berrypicker, etc.	8	0.4
Fisherman	22	1.0
Hunter	71	3.3
Work crew, etc.	44	2.0
Internal Combustion Engine	876	40.6
Miscellaneous	55	2.6
Non-man caused lightning	32	1.5

ce Materials	Continued and Additional Suggested Learning Experiences
rt, Department State of	I. (continued) 5. many times greater than the fires caused by transients (to the nearest tenth) 6. Construct a circle graph of the 1968 data showing those people responsible for fires. Also include the non-man made forest fires.
minutes, itannica Edu- rth Michigan bis 60611 ion Films, ield, N.J.	

TABLE I

NUMBER OF FIRES BY CLASS OF PEOPLE RESPONSIBLE

Class of People	1967		1968	
	No.	%	No.	%
Local Resident	889	41.2	1,199	50.7
Transient	159	7.4	185	7.8
Berrypicker, etc.	8	0.4	2	0.1
Fisherman	22	1.0	24	1.0
Hunter	71	3.3	42	1.8
Work crew, etc.	44	2.0	49	2.1
Internal Combustion Engine	876	40.6	759	32.1
Miscellaneous	55	2.6	84	3.6
Non-man caused lightning	32	1.5	19	0.8

ESEA Title III - 59 - 70-0135 Project I-C-E

CONCEPT 11. Individual acts, duplicated or compounded, produce significant environmental alterations over time.

Discipline Area Mathematics

Subject Statistics

Problem Orientation Pollution

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
Cognitive: The student will interpret data through a questionnaire and survey to assess how "man" pollutes. Affective: The student will recognize the need for anti-pollution programs	I. Student-Centered in class Activity A. Students should discuss whether they are polluters and then fill out the attached questionnaire, "Am I A Polluter?" B. Tabulate the results of the questionnaire and discuss what they as individuals and as a class can do to prevent pollution.	II. Outside Communit A. Commun survey or Make peop their own pliances, B. School Find out per squar grounds, this be c Council m Anti-Poll tabulate before a C. Chart in school
Skills to be Learned: Predicting Taking Information Supplying Data Graphing		

, duplicated

produce significant

lterations over

Discipline Area Mathematics

Subject Statistics

Problem Orientation Pollution Grade 7

CS	SUGGESTED LEARNING EXPERIENCES	
nt will gh a rvey to lutes. ent will or anti-	I. Student-Centered in class Activity A. Students should discuss whether they are polluters and then fill out the attached questionnaire, "Am I A Polluter?" B. Tabulate the results of the questionnaire and discuss what they as individuals and as a class can do to prevent pollution.	II. Outside Resource and Community Activities A. Community (neighborhood) survey on "Am I a Polluter?" Make people more aware of their own over-use of appliances, etc. B. School project: Find out the amount of pollution per square yard on the playgrounds, halls, etc. How can this be corrected? Student Council may want to have an Anti-Pollution Day or Week and tabulate the results - a before and after program. C. Chart and publish results in school newspaper, etc.

Resource and Reference Materials	Continued and Additional Sugg
Publications: Questionnaire - attached to lesson , "Am I A Polluter" Audio-Visual: Film # 7650, Junkdump, $9, 1970, BAVI Community:	

erence Materials	Continued and Additional Suggested Learning Experiences
ached to olluter"	
mp, $9,	

AM I A POLLUTER ?

QUESTIONNAIRE

Many of us have become increasingly aware of the problems of pollution, but have we stopped to think about the extent to which each of us contributes to the destruction of our environment? This questionnair is designed to help us determine how much we pollute. After we fill this in, perhaps we will be in a better position to stop pollution.

Answer the following questions by circling either yes or no.

Yes No 1. I always throw paper away in trash barrels, pick up my camp site and picnic grounds.

Yes No 2. I ask my parents to buy returnable bottles and soaps low in phosphate.

Yes No 3. I own nothing which requires the use of electricity.

Yes No 4. I walk or bike to school and other places as much as possible.

Yes No 5. I buy goods in returnable containers and in cardboard boxes rather than in plastic containers when I have the choice.

Yes No 6. I turn the lights off when I am not using them.

Yes No 7. I have bothered to learn about the problems of pollution and will try to help solve them in my community and in my country.

CHECK THE FOLLOWING IF IT APPLIES TO YOUR FAMILY:

In order to cut down on air pollution and avoid draining the world of non-renewable resources such as coal, we will have to change some of our habits. Before we can do this we need to know to what extent we actually demand the use of gas and electricity. Some of these are essentials, some aren't. Check all the ones your family has; then begin to consider what you can give up.

_____ vacuum cleaner	_____ electric heater	_____ electric can opener
_____ hair dryer	_____ electric typewriter (why not a portable)	_____ dishwasher
_____ electric toothbrush (is this really necessary)	_____ dehumidifier	_____ stove
_____ washing machine	_____ toaster	_____ refrigerator
_____ dryer	_____ electric fry pan	_____ alarm clock

in phosphate.

Yes No 3. I own nothing which requires the use of electricity.

Yes No 4. I walk or bike to school and other places as much as possible.

Yes No 5. I buy goods in returnable containers and in cardboard boxes rather than in plastic containers when I have the choice.

Yes No 6. I turn the lights off when I am not using them.

Yes No 7. I have bothered to learn about the problems of pollution and will try to help solve them in my community and in my country.

CHECK THE FOLLOWING IF IT APPLIES TO YOUR FAMILY:

In order to cut down on air pollution and avoid draining the world of non-renewable resources such as coal, we will have to change some of our habits. Before we can do this we need to know to what extent we actually demand the use of gas and electricity. Some of these are essentials, some aren't. Check all the ones your family has; then begin to consider what you can give up.

_____ vacuum cleaner	____electric heater	____electric can opener
_____ hair dryer	____electric typewriter (why not a portable)	____dishwasher
_____ electric toothbrush (is this really necessary)	____dehumidifier	____stove
_____ washing machine	____toaster	____refrigerator
_____ dryer	____electric fry pan (what's wrong with the others)	____alarm clock (electric)
_____ fan	____blender	____electric razor (hand razors give closer shav
_____ air conditioner (how many days is it unberably hot	____garbage disposal	____tape recorder (non-portable)
_____ television	____electric knife (really?)	____record player (non-portable)
_____ radio (non-portable)		

(continued on reverse side)

QUESTIONNAIRE
(continued)

AM I A POLLUTER?

IN ORDER TO FURTHER CUT DOWN ON AIR AND OTHER POLLUTION, MY FAMILY:

Yes No 1. Rides bikes or walks instead of riding in cars.

Yes No 2. Has only one car.

Yes No 3. Has no snowmobiles.

Yes No 4. Has no motor boats.

Yes No 5. Never burns leaves or garbage.

Yes No 6. Recycles newspapers rather than throwing them out.

Yes No 7. Uses Trend or Fab soap which are low in phosphates.

Now that you have filled this out, rate yourself; I am

_____ CLEAN (a non-polluter). If you and your family answered all the questions with a yes and checked only 4 of the appliances.

_____ GRAY (a partial polluter) If you and your family answered 7 or more questions yes and checked no more than 10 appliances.

_____ DIRTY (a polluter). If you and your family answered 8 or more questions no and checked over 10 appliances.

THINK ABOUT IT AND HELP SAVE OUR ENVIRONMENT

ESEA Title III -59-70-0135-2 Project I-C-E

CONCEPT 12. Private Ownership must be regarded as a stewardship and should not encroach upon or violate the individual rights of others.

Discipline Area Mathemati

Subject Problem S

Problem Orientation Fores

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPER	II.
Cognitive: The student will first estimate and then find exact answers to problems concerning forestry operations and the preservation of our trees. Affective: The students will be more appreciative of the beauty and value of a living tree.	I. Student-Centered in class activity A. In the following problems, first round off and estimate the answer; then find the exact answer. 1. A forest fire that was discovered at 3:55 p.m. on Tuesday was brought under control at 4:30 a.m. on Thursday. How many hours was the fire out of control? 2. In a recent year, 7,283 forest fires west of the Rockies caused losses averaging $1,435 per fire. What was the total loss? 3. In the U.S. there are 151 national forests totaling 181,255,449 acres. Find the average number of acres per national forest. 4. Mr. Hill hired boys to set out seedlings on 37 acres of worn out pasture land. He needed 1050 seedlings (continued on reverse)	
Skills to be Learned: Rounding off Numbers Estimation Basic Computation Percent		

Ownership must be
a stewardship and should
n upon or violate the
rights of others.

Discipline Area Mathematics

Subject Problem Solving & Estimating

Problem Orientation Forestry Grade 7

L OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
he student will e and then find to problems restry operations rvation of our he students will ciative of the lue of a living	I. Student-Centered in class activity A. In the following problems, first round off and estimate the answer; then find the exact answer. 1. A forest fire that was discovered at 3:55 p.m. on Tuesday was brought under control at 4:30 a.m. on Thursday. How many hours was the fire out of control? 2. In a recent year, 7,283 forest fires west of the Rockies caused losses averaging $1,435 per fire. What was the total loss? 3. In the U.S. there are 151 national forests totaling 181,255,449 acres. Find the average number of acres per national forest. 4. Mr. Hill hired boys to set out seedlings on 37 acres of worn out pasture land. He needed 1050 seedlings (continued on reverse)	II. Outside Resource and Community Activities A. Visit a tree farm or local Nursery. B. 1. Observe the method of tree planting used and the types of trees planted. 2. Determine how long it takes for a tree to reach maturity. 3. What care is required to have a successful tree farm. C. Have a forester speak to the class on forestry practices.
Learned: Numbers tion		

Resource and Reference Materials	Continued and Additional Suggested Learning
Publications: U.S. Forest Products Lab, Madison, Wisconsin U.S. Forest Service Audio-Vidual: Film #5251 - Biology: Tropical Rain Forest, $7.25, B.A.V.I., 1961 Film #5250 - Temperate Deciduous Forest, $7.25, B.A.V.I., 1962 Film #4804- Biology: Coniferous Forest Biome, $6.75, B.A.V.I., 1969 Film # 3313 - Life in the Forest, North America, $3.50, B.A.V.I., 1955 Community: U.S. Forester	I. (continued) 4. per acre. How many did he need in 5. Mr. Hill owned 200 acres of timberl offered $2,850 for all the trees on it he thinned his woods with a forester's $5,925 worth of trees for lumber and $ for firewood. How much more did he ma his woods. Why was thinning also an a land? 6. A man bought 42 acres of worn out f an acre. By using wise conservation p improved the land so much,that in 10 y valued at $5,450. How much had the la value in the 10 years? What percent h his investment?

nce Materials	Continued and Additional Suggested Learning Experiences
s Lab,	I. (continued) 4. per acre. How many did he need in all? 5. Mr. Hill owned 200 acres of timberland. He was offered $2,850 for all the trees on it. Instead, he thinned his woods with a forester's help. He sold $5,925 worth of trees for lumber and $4,212 worth for firewood. How much more did he make by thinning his woods. Why was thinning also an advantage for his land? 6. A man bought 42 acres of worn out farm land for $15 an acre. By using wise conservation practices, he improved the land so much,that in 10 years, it was valued at $5,450. How much had the land increased in value in the 10 years? What percent had he gained on his investment?
: Tropical B.A.V.I., 1961	
te Deciduous .I., 1962	
Coniferous B.A.V.I.,	
n the Forest, , B.A.V.I.,	

PROJECT I-C-E Episode Evaluation Form (Reproduce or duplicate as

Please fill in:
Subject: _____

Grade: _____

Concept No. Used: _____

In commenting on each episode used in your class form. Feel free to adapt it and add more pages. your critiques and comments - negative and positiv hand column, please rate (poor, good, excellenc) make specific comments or suggestions if possible vided to help us make this a more usable guide.

Poor	Good	Exc.	
			I. Behavioral Objectives A. Cognitive:
			B. Affective:
			II. Skills Developed
			III. Suggested Learning Experiences A. In Class:
			B. Outside & Community Activities:
			IV. Suggested Resource & Reference Materials (specific suggestions & comments)

Serving Sch

G

CJECT I-C-E Episode Evaluation Form (Reproduce or duplicate as needed)

_____
_____
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_____

In commenting on each episode used in your class, please use this form. Feel free to adapt it and add more pages. Let us know all your critiques and comments - negative and positive. In the left-hand column, please rate (poor, good, excellent) each item. Also, make specific comments or suggestions if possible in the space provided to help us make this a more usable guide. Thank you.

I. Behavioral Objectives
A. Cognitive:

B. Affective:

II. Skills Developed

III. Suggested Learning Experiences
A. In Class:

B. Outside & Community Activities:

IV. Suggested Resource & Reference Materials
(specific suggestions & comments)

Project I-C-E
Serving Schools in CESA 3-8-9
1927 Main Street
Green Bay, WI 54301

Project I - C - E INSTRUCTION - CURRICULUM - ENVIRONMENT

ED 079158

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NATIONAL INSTITUTE OF
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A SUPPLEMENTARY PROGRAM FOR ENVIRONMENTAL EDUCATION

DISCIPLINE AREA Mathematics GRADE 8

Produced under Title III E.S.E.A.
PROJECT I-C-E
Serving Schools in CESA 3-8-9
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George Howlett, EE Specialist

PREFACE

"Oikus" for house is the Greek origin of the term "ecology". Environmental educatio studies our house--whatever or wherever it may be. Like an umbrella, our house can expand or contract to fit many ranges--natural and man-made. We can add quality to ou environments, our many "houses" if we omit rancor and cite long range gains, costs, an complexities. Our "oikus" uses the insights of all subjects. Thus, a rational, posit multidisciplinary program like ours necessarily results. Also, since attitudes grow o a long time, our program ranges K thru 12. The environment mirrors our attitudes or values. These values have their origin in the "oikus" of our collective and individua minds. Let us become masters of our house by replacing the Greek adage of "Know thyse with "Know thyself and thine house."

1. Written and designed by your fellow teachers, this guide is <u>supplementary</u> in nature to fit appropriately into existing, logical course content.
2. Each page or episode offers <u>suggestions</u>. Knowing your students best, you decide wh to <u>adapt</u> or <u>adopt</u>. Limitless chances are here for your experimentation and usage. Many episodes are self contained, some open-minded, still others can be changed or developed over a few days.
3. <u>Try these episodes</u>, but <u>please pre-plan</u>. Why? Simply, no guide has all the answer and no curriculum will work unless viewed in the context of your students.
4. <u>React</u> to this guide with scratch ideas and notes on the episode pages.
5. After using an episode, <u>fill out the attached evaluation form</u> in the back. Use, duplicate, or request more of these forms. Send them singly or collectively to us. We sincerely want your reactions or suggestions--negative and positive. <u>Your evaluations are the key</u> in telling us "what works" and in aiding our revisions of the guides.

TERMS AND ABBREVIATIONS

ICE RMC is <u>Project ICE Resource Materials Center</u> serving all public and non-public school districts in CESA 3, 8, and 9. Check the Project ICE Bibliography of available resources. Our address and phone number is on this guide's cover. Feel free to write or call us for any materials or help.

BAVI is Bureau of Audio Visual Instruction, 1327 University Avenue, P. O. Box 2093, Madison, Wisconsin 53701 (Phone: 608-262-1644).

Cognitive means a measurable mental skill, ability, or process based on factual data

Affective refers to student attitudes, values, and feelings.

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ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT 1. Energy from the sun, the basic source of all energy, is converted through plant photosynthesis into a form all living things can use for life processes

Discipline Area Math

Subject Radius, dia

Problem Orientation Energy

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIE	
Cognitive: Students will calculate by similar triangles that the sun is a very large mass of gases in the heavens. Affective: The student will become alerted to the idea that the sun's energy received by the earth, although very small, is very necessary for all life to exist. Skills to be Learned 1. Radius 2. Diameter 3. Area 4. Similarity of triangle 5. Ratio 6. Proportion	I. Student-Centered in class activity A. Calculate the radius, diameter and area of the sun. (See attached sheet) B. Discuss in class the following ideas: 1. Ask the students to suggest the percentage of sunlight that reaches the earth taking into consideration the distance the sun is from the earth and the size of the sun and the earth. 2. Compare the suggested percentages of sunlight reaching the earth to the amount received as found in a scientific source. a. Discuss how air pollution may affect the amount solar energy reaching the earth. b. Have the students suggest ideas on increasing the use and amount of solar energy reaching the earth.	II. Outside Communit A. Inform center obtain B. Outsi 1. A cus of va du fi ph 2. An po gr

the sun, the basic	Discipline Area	Math
energy, is converted	Subject	Radius, diameter and area
photosynthesis into a	Problem Orientation	Energy
g things can use for life		Grade 8

CTIVES	SUGGESTED LEARNING EXPERIENCES	
nts will lar e sun ass of vens. udent ed to sun's y the very cessary exist.	I. Student-Centered in class activity A. Calculate the radius, diameter and area of the sun. (See attached sheet) B. Discuss in class the following ideas: 1. Ask the students to suggest the percentage of sunlight that reaches the earth taking into consideration the distance the sun is from the earth and the size of the sun and the earth. 2. Compare the suggested percentages of sunlight reaching the earth to the amount received as found in a scientific source. a. Discuss how air pollution may affect the amount solar energy reaching the earth. b. Have the students suggest ideas on increasing the use and amount of solar energy reaching the earth.	II. Outside Resource and Community Activities A. Information for the student-centered activity can be obtained from the library. B. Outside speakers 1. A biology teacher-a discussion about the process of photosynthesis. Relate various experiments conducted with different light filters on the process of photosynthesis. 2. An ecologist-relate the air pollution problem to plant growth and development.
rned triangle		

Resource and Reference Materials

Publications:

Books: 110 Energy Sources, I-C-E
TH RMC
Wisconsin Survival Handbook, Doug LaFollette and Peter Anderson, 1971

Audio-Visual:

Film #5553 - Photosynthesis ($8.75) BAVI, 1963

Film #6753 - Green Plants and Sunlight ($4.00), BAVI, 1966

Film #4170-4171 - Our Mr. Sun ($4.00) BAVI, 1956

Film #6949 - Sun's Energy ($5.00), BAVI, 1963

Community:

Library
Biology teacher
An ecologist

Continued and Additional Suggested Learnin

A. Calculating the Radius and Diameter of
1. Draw two parallel lines, one inch ap
white cardboard and fold. (See figu

FIG. 1

2. Select a room facing the sun. Get
possible by pulling the shades or d
amount of sunlight through a pinhol
piece of cardboard. Place in the w

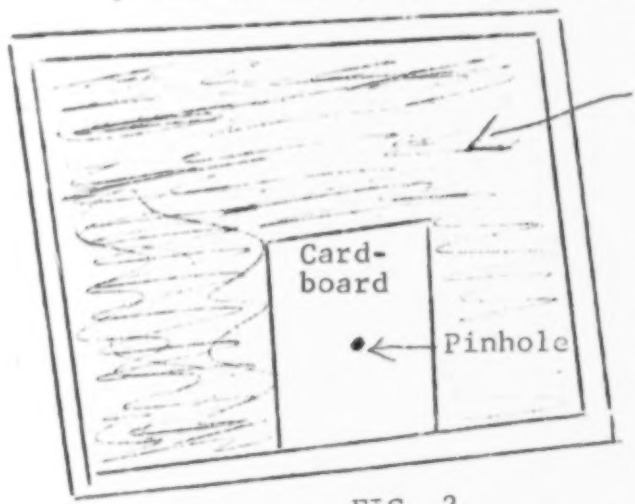
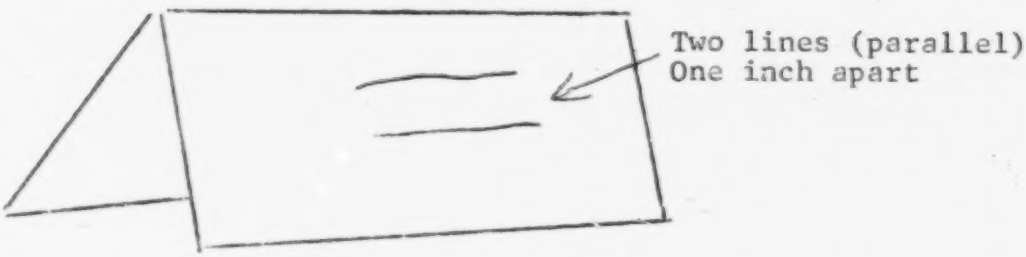
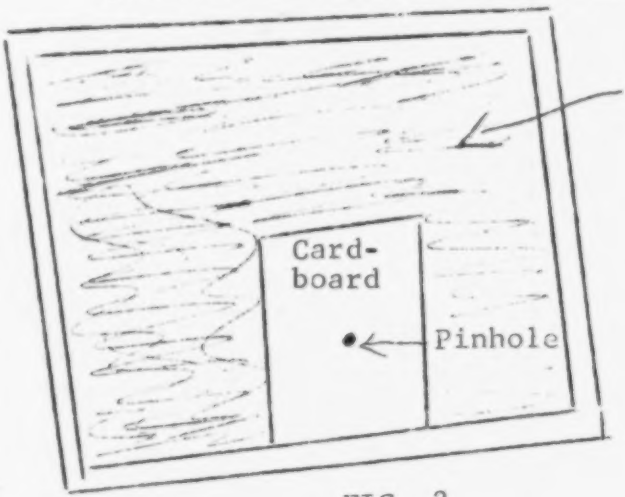


FIG. 2

nterials	Continued and Additional Suggested Learning Experiences
, I-C-E ival Hand- ollette rson, 1971 is ($8.75) and Sun- 66 Sun ($4.00) ($5.00),	A. Calculating the Radius and Diameter of the Sun 1. Draw two parallel lines, one inch apart on a piece of white cardboard and fold. (See figure 1)  FIG. 1 2. Select a room facing the sun. Get the room as dark as possible by pulling the shades or drapes. Allow a small amount of sunlight through a pinhole which is made in a piece of cardboard. Place in the window. (See figure 2)  FIG. 2

4. cont. $\therefore \frac{AB}{A'B'} = \frac{BC}{B'C'} = \frac{AC}{A'C'}$

By using the idea of ratios and proportion, the sides $\overline{AC}$ and $\overline{BC}$ can be calculated.

5. By using this knowledge we can construct two triangles based on the information ga room with the image of the sun.

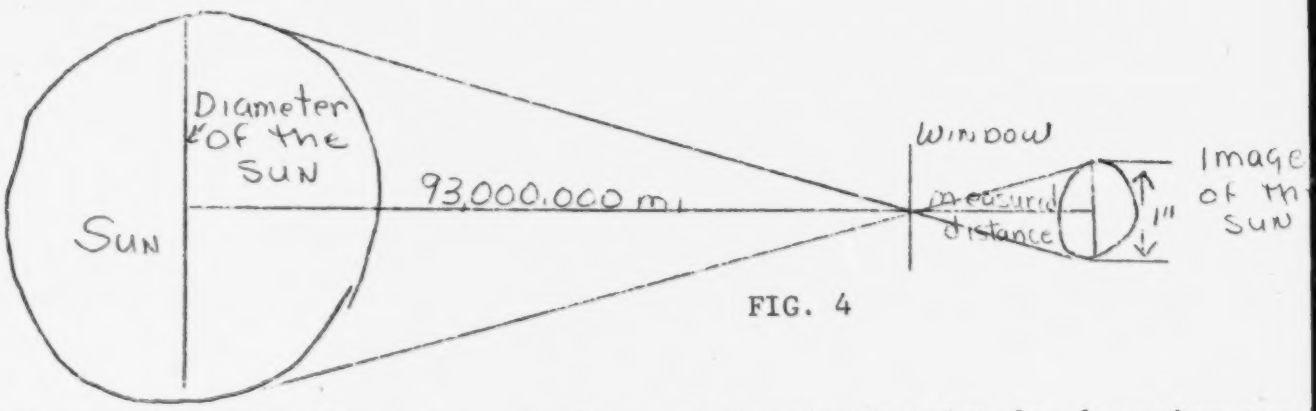


FIG. 4

By referring to the above figure, we can form our imaginary triangler by using one figure shown.

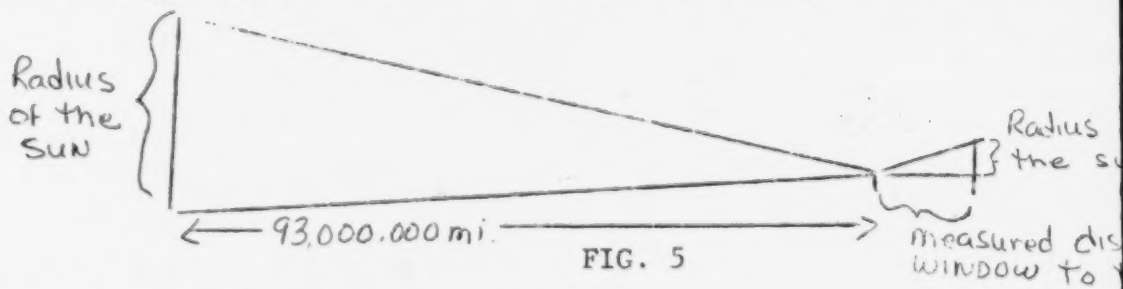


FIG. 5

Using a proportion, we can calculate the radius of the sun

$$\frac{\text{Radius of the sun}}{93{,}000{,}000 \text{ miles}} = \frac{\text{Radius of the circle } (\frac{1}{2} \text{ in.})}{\text{Measured distance from window to image}}$$

$\frac{}{C'} = \frac{AC}{A'C'}$

ratios and proportion, the sides $\overline{AC}$ and $\overline{BC}$ can be calculated.

dge we can construct two triangles based on the information gathered in the of the sun.

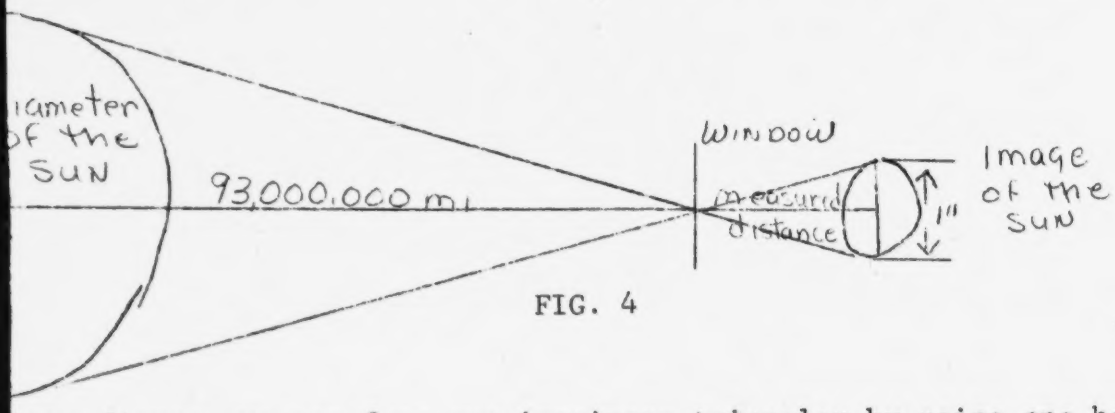


FIG. 4

bove figure, we can form our imaginary triangler by using one half of the

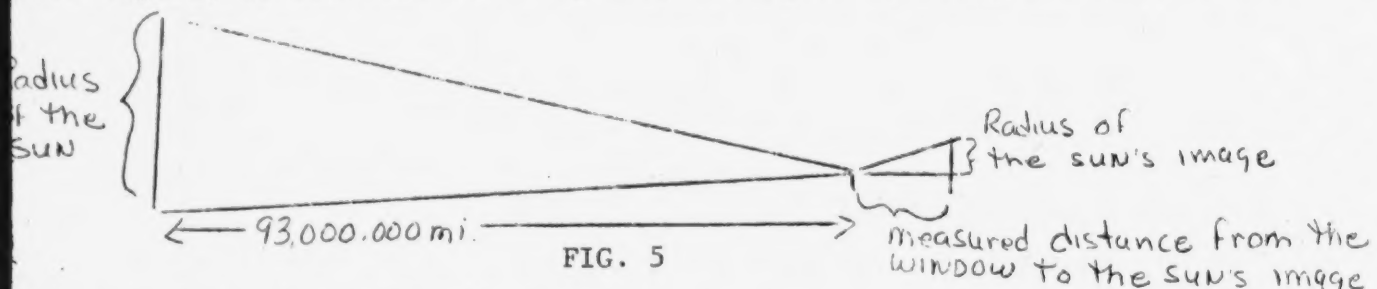


FIG. 5

can calculate the radius of the sun

$= \frac{\text{Radius of the circle } (\frac{1}{2} \text{ in.})}{\text{Measured distance from window to image}}$

Continued and Additional Suggested Learning Experiences

3. Set up the cardboard in figure 1 so that the sunlight coming through the pinhole
on it. A small image of the sun will appear on the cardboard. Adjust the cardbo
sunlight is found between the one inch lines. The image of the sun is one inch
Now measure the distance from the image of the sun to the pinhole on the cardboar
as possible. (See figure 3)

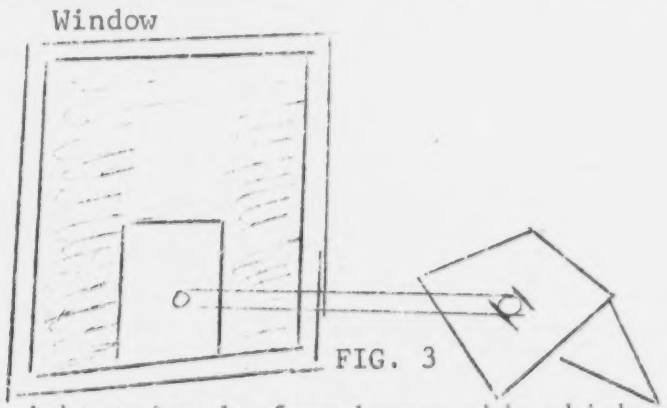
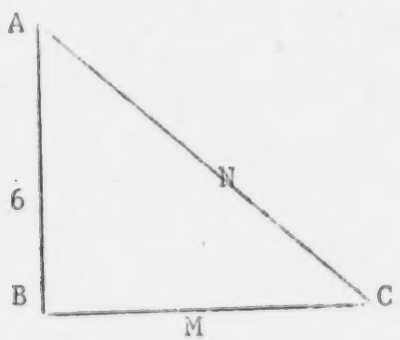
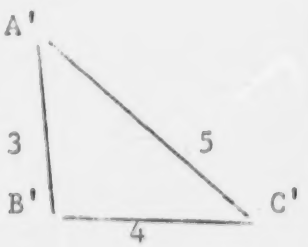


FIG. 3

4. Review the idea of similarity in right triangle from known side which may corres
sides.





Definition of similarity:

Point A corresponds to point A'
Point B corresponds to point B'
Point C corresponds to point C'

Side AB corresponds to side A'B'
Side BC corresponds to side B'C'
Side AC corresponds to side A'C'

(cont.)

Suggested Learning Experiences

figure 1 so that the sunlight coming through the pinhole falls directly
of the sun will appear on the cardboard. Adjust the cardboard so that the
en the one inch lines. The image of the sun is one inch in diameter.
e from the image of the sun to the pinhole on the cardboard as accurately
ire 3)

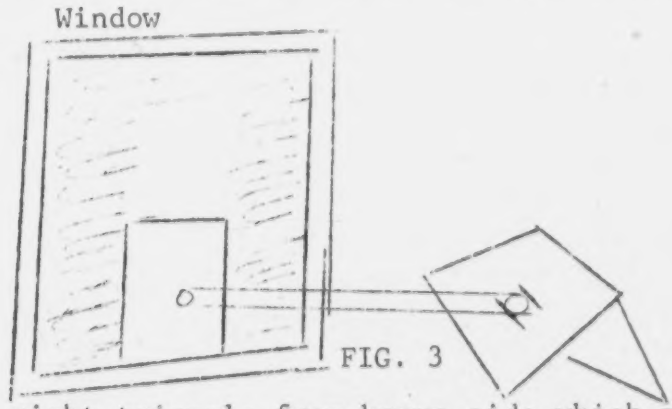
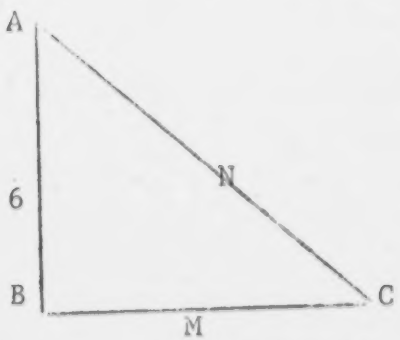
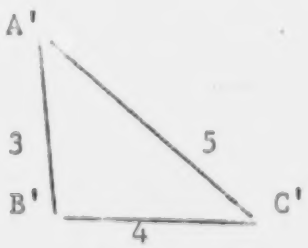


FIG. 3

ilarity in right triangle from known side which may correspond to unknown





ty:

to point A'
to point B'
to point C'

to side A'B'
to side B'C'
to side A'C'

(cont.)

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT

2. All living organisms interact among themselves and their environment, forming an intricate unit called an ecosystem.

Discipline Area: Math

Subject: Graphing - m

Problem Orientation: Land use

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
Cognitive: The student will construct a cover map of a 40 acre plot showing the various terrain. Affective: The student will suggest through examples the balance of nature is a delicate system which may be changed and affected easily by man. Skills to be Learned 1. Map reading 2. Scale drawing 3. Compass reading	I. Student-Centered in class activity A. Review the use of scales in map reading. Then determine the scale to be used in constructing a cover map. 1. Use the metric system relief maps found in the classroom to show that various scales may be used on different maps. 2. Use the plot map and aerial photographs in the classroom for understanding of scale drawing. B. After the field trip is completed, each group will construct a cover map for the area. (Suggested that a 40 acre plot will be sufficient)	II. Outside Res Community Ac A. Obtain the photo fro house for B. Contact th Natural R map examp made throu C. Conduct a 40 acres 1. Measur scale 2. Measur scale

ll living organisms interact among
elves and their environment,
ng an intricate unit called
osystem.

Discipline Area Math

Subject Graphing - map construction

Problem Orientation Land use Grade 8

R/L OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
e: The student struct a cover 40 acre plot the various e: The student gest through the balance of s a delicate hich may be end affected y man.	I. Student-centered in class activity A. Review the use of scales in map reading. Then determine the scale to be used in constructing a cover map. 1. Use the metric system relief maps found in the classroom to show that various scales may be used on different maps. 2. Use the plot map and aerial photographs in the classroom for understanding of scale drawing. B. After the field trip is completed, each group will construct a cover map for the area. (Suggested that a 40 acre plot will be sufficient)	II. Outside Resource and Community Activities A. Obtain the plot map and aerial photo from the county court house for use in the classroom. B. Contact the Department of Natural Resources for cover map examples which they have made through surveys. C. Conduct a field trip through 40 acres of land. 1. Measure fields and draw to scale (meters). 2. Measure hills and draw to scale (meters).
o be Learned eading drawing ss reading		

Resource and Reference Materials	Continued and Additional Suggested Learning
Publications: Klausner, Samuel, 1971. On Man in His Environment Subarsky, Azc Hariah, 1969. Living Things in Field and Classroom Urban Systems, Inc., 1970. Ecology's The Game of Man and Nature Audio-Visual: Movie: #210 Nature's Half Acre, color, 16 mm., Project I-C-E RMC #200 One Day at Teton Marsh (2 parts) color, 16 mm., Project I-C-E RMC #2359 This Vital Earth, 10 min., color, $3.50, BAVI Community: 1. County seat or court house 2. DNR	

ce Materials	Continued and Additional Suggested Learning Experiences
1. On Man in 1969. Living lassroom 1970. Ecology's ature re, color, I-C-E RMC Marsh (2 parts) roject I-C-E n, 10 min., AVI t house	

CONCEPT

3. Environmental factors are ls are limiting on the numbers of organisms liisms living within their influence, thus, thus, each environment has a carrying caping capacity.

Discipline Area: Mathematics

Subject: Average and Percent

Problem Orientation: Disease Grade: 8

BEHAVIORAL OBJECTIVES		SUGGESTED LEARNING EXPERIENCES	
Cognitive: Given information on corn blight, the student will compute averages and percents to show the effect of corn blight on the U.S. corn crop. Affective: The students will recognize the fact that certain environmental factors (such as disease) limit the amount of certain agricultural crops a farmer can produce.	I. St act A. B.	I. Student-Centered in class activity A. Class discussion pertaining to the given worksheet on corn crops. Have the students set up & work the problems from the worksheet on the board. B. Having discussed the work-sheet, combine the information obtained from the sheet & the 2 outside activities. What conclusions can the student draw from this information?	II. Outside Resource and Community Activities A. Contact the local agricultural agent in regard to obtaining information on how corn blight has affected the local area. B. The students will do library research on past history of the effects of corn blight.
Skills to be Learned Averaging Finding Percents Computations involving percents	C.	C. Students that have completed library research on the history of corn blight, will consolidate their findings and present an oral report to the class. Findings should include such mathematical ideas as: 1. Percent of corn affected in an area. 2. Number of counties affected. 3. Comparison of affect in the last couple of years. Note: Worksheet on reverse side.	C. The students that have checked with their local agri. agent will hand in a written report on their findings. After the reports are checked, post them on a bulletin board.

ESEA Title III - 59-70-0135-2 Project I-C-E

Resource and Reference Materials

Publications:

Numbers In the News, Subject: The Threat to Our Corn Crop
published by Christopher Lee Pub
P.O. Box 331
Glencoe, Il. 60022

Audio-Visual:

Food For a Modern World, #0704, BAVI, Color, 22 min.
Corn Farmer, 2nd Ed., Color, #5854, BAVI, 14 min.

Community:

Local library
Farm Bureau (county level)
State Dept. of Agriculture

Continued and Additional Suggested Learning

Numbers In The News Subject: The Threat

This summer, agricultural people became ve
the threat to corn production. Southern Leaf
damage large amounts of corn in the field. S
covered that the blight had spread to corn f
As corn is our most valuable farm crop, it i
as corn, either directly or indirectly, is a
diet, the threat to the corn crop is importa

Directly, we eat about 45 lbs. of corn per
many kinds of food are made from corn. We al
quantities of meat that was raised on corn.

United States Corn Crop

	1967	1968	1969
Acres of Corn Harvested (in 1,000 acres)	60,557	55,707	54,573
*Yield per Acre (in bu.)	78.6	78.5	83.9
Production (million bu)	4,760	4,375	4,578
Price (per bushel)	$1.04	$1.05	$1.09

*A bushel of corn weighs 56 pounds.

5. Using the average of the past 3 yrs. (see will be the 1970 production of corn if: (20% destroyed 30% destroyed 40
6. What was the avg. value of an acre of cor 1969? 1968? 1967? (nearest cent)
7. What will probably happen to the price of amount is destroyed by the blight?
8. Using the 3 yr. avg., what was the weight harvested for 1 yr. on one acre? (nearest
9. How many people can receive enough corn directly in 1 yr. from one acre of corn?
10. Using the 3 yr. avg. what is the value of to the farmer?(to nearest cent)
11. Using the answers from problems 9 & 10, farmer receive for supplying enough corn for one year? (to nearest cent?
12. What would be the gross income of a farm acres of corn? (Use 1969 figures)
13. What would we need to know to compute th farmer?

Copr. Christopher Lee Pub., P.O. Box 331

Continued and Additional Suggested Learning Experiences

Numbers In The News Subject: The Threat to Our Corn Crop

This summer, agricultural people became very concerned about the threat to corn production. Southern Leaf Blight began to damage large amounts of corn in the field. Soon, it was discovered that the blight had spread to corn fields in the Midwest. As corn is our most valuable farm crop, it is big business. And, as corn, either directly or indirectly, is a major portion of our diet, the threat to the corn crop is important to all of us.

Directly, we eat about 45 lbs. of corn per year per person as many kinds of food are made from corn. We also eat large quantities of meat that was raised on corn.

United States Corn Crop

	1967	1968	1969	Avg. 3 yr. Period
Acres of Corn Harvested (in 1,000 acres)	60,557	55,707	54,573	(1)_ _ _ _ _ _ _
*Yield per Acre (in bu.)	78.6	78.5	83.9	(2)_ _ _ _ _ _ _
Production (million bu)	4,760	4,375	4,578	(3)_ _ _ _ _ _ _
Price (per bushel)	$1.04	$1.05	$1.09	(4)_ _ _ _ _ _ _

*A bushel of corn weighs 56 pounds.

5. Using the average of the past 3 yrs. (see answer 3) what will be the 1970 production of corn if: (in million bushels)
   20% destroyed 30% destroyed 40% destroyed
6. What was the avg. value of an acre of corn to a farmer in 1969? 1968? 1967? (nearest cent)
7. What will probably happen to the price of corn if a large amount is destroyed by the blight?
8. Using the 3 yr. avg., what was the weight of the corn harvested for 1 yr. on one acre? (nearest pound)
9. How many people can receive enough corn that they eat directly in 1 yr. from one acre of corn? (to nearest person)
10. Using the 3 yr. avg. what is the value of 1 acre of corn to the farmer?(to nearest cent)
11. Using the answers from problems 9 & 10, how much does the farmer receive for supplying enough corn to feed one person for one year? (to nearest cent?
12. What would be the gross income of a farmer who had 150 acres of corn? (Use 1969 figures)
13. What would we need to know to compute the net income of the farmer?

Copr. Christopher Lee Pub., P.O. Box 331, Glencoe, Il. 60022

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT: 4. An adequate supply of pure water is essential for life.

Discipline Area: Math

Subject: Rates, equation

Problem Orientation: Water Shortage

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCE	
Cognitive: The student will, by comparing the water needs to the water supply, predict a water shortage by the year 2000. Affective: The student will actively participate in a class discussion suggesting ways of conserving the usable water supply. Skills to be Learned Writing equations for finding percentage rate Computing rates	I. Student-Centered in class activity A. Introduction: 1. On an average, 1,800 gallons of water is consumed per person each day. We are now using 355 billion gallons per day in this country. 2. The population of the U.S. in 1950 was about 150 million, 1965 about 200 million and in 1980 it will be over 300 million. 3. An estimate of the dependable supply of fresh water is 650 B.G.D. (billion gallons per day). Note: Sample problems and a chart are on the reverse side.	II. Outside Res Community Ac A. Visit a system. H questions 1. How mu comes plant 2. Is th when For wh can i B. Visit a system. question 1. What of th water 2. How m used 3. At th long suppl

equate supply of pure

essential for life.

Discipline Area Math

Subject Rates, equations, computations

Problem Orientation Water Shortage Grade 8

ORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
The student mparing the s to the water edict a water the year The student ly participate discussion ways of the usable ly.	I. Student-Centered in class activity A. Introduction: 1. On an average, 1,800 gallons of water is consumed per person each day. We are now using 355 billion gallons per day in this country. 2. The population of the U.S. in 1950 was about 150 million, 1965 about 200 million and in 1980 it will be over 300 million. 3. An estimate of the dependable supply of fresh water is 650 B.G.D. (billion gallons per day). Note: Sample problems and a chart are on the reverse side.	II. Outside Resource and Community Activities A. Visit a local sewage system. Have these questions in mind. 1. How much used water comes into the plant? 2. Is the water usable when it leaves? For what purposes can it be used? B. Visit a local water system. Have these questions in mind. 1. What is the source of the community water supply? 2. How much water is used each day? 3. At this rate how long will the supply last?
be Learned uations for ercentage rate rates		

Resource and Reference Materials	Continued and Additional Suggested Learning Exp

Publications:
Water Pollution, I-C-E RMC
Running Water, I-C-E RMC

Audio-Visual:
Investigations in Ecology - Kit
I-C-E RMC

Community:
Local sewage plant
Local industries which make use of water
Local water system

I. (cont.)

B. Chart of the three primary users of water 1900-1980.

	1900	1960	1980
Industry	15 BGD	160 BGD	394 BGD
Agriculture	22 BGD	141 BGD	166 BGD
Municipal	3 BGD	22 BGD	37 BGD
Totals	40 BGD	323 BGD	597 BGD

(BGD - billion gallons per day)

Sample Problems: Write equations and solve

1. Rate of increase from 1900 to 1960 for
2. Industries rate of increase from 1960 t
3. Same for agriculture and municipal and as for industry.
4. Predict total amount of water needed by three users in the year 2000.
5. It is estimated that 650 BGD's of fresh will be available in the year 2000. Com the prediction for problem 4 with the a of water available.
   a. How much more? How much less?
6. Discuss ways of conserving water.

ce Materials	Continued and Additional Suggested Learning Experiences
-E RMC RMC	I. (cont.) B. Chart of the three primary users of water from 1900-1980.

	1900	1960	1980
Industry	15 BGD	160 BGD	394 BGD
Agriculture	22 BGD	141 BGD	166 BGD
Municipal	3 BGD	22 BGD	37 BGD
Totals	40 BGD	323 BGD	597 BGD

(BGD - billion gallons per day)

Sample Problems: Write equations and solve.

1. Rate of increase from 1900 to 1960 for industry.
2. Industries rate of increase from 1960 to 1980.
3. Same for agriculture and municipal and total as for industry.
4. Predict total amount of water needed by these three users in the year 2000.
5. It is estimated that 650 BGD's of fresh water will be available in the year 2000. Compare the prediction for problem 4 with the amount of water available.
   a. How much more? How much less?
6. Discuss ways of conserving water.

ology - Kit
ch make use

CONCEPT		
4. An adequate supply of pure water is essential for life.	Discipline Area	Math
	Subject	Percents &
	Problem Orientation	Usable Wa

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERI	
Cognitive: By completing the tables, the student will tabulate the total water supply and the percent of usable water that exists. Affective: The student will accept the need for wise usuage of water.	I. Student-Centered in class activity A. The students will, individually, complete the worksheet on "The World's Water". The teacher will assist students with their class work. B. The students will take the percents they calculated from Part A and convert these percents to decimal numerals. Note: Sample of Worksheet on "The World's Water" is on the reverse side.	II. C C A
Skills to be Learned Finding percents Computations involving percents Converting fractions to percents		

ate supply of pure

sential for life.

Discipline Area Math

Subject Percents & Fractions

Problem Orientation Usable Water Grade 8

OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
completing student the total nd the ble water student need for water. earned ts nvolving ctions to	I. Student-Centered in class activity A. The students will, individually, complete the worksheet on "The World's Water". The teacher will assist students with their class work. B. The students will take the percents they calculated from Part A and convert these percents to decimal numerals. Note: Sample of Worksheet on "The World's Water" is on the reverse side.	II. Outside Resource and Community Activities A. The students will contact outside sources and get information on how much water is polluted and how much water is usable in certain states of the U.S. 1. Each student will be assigned a group of three states to contact. 2. Students will report on their findings to the class. B. The teacher can contact the city's director of Public Works to come to class and give a talk. His talk should be centered around the amount of usable water & polluted water found in the city.

Resource and Reference Materials

Publications:

Comprehend, Compute & Learn
Subject: The World's Water
Published by:
Christopher Lee Publications
P.O. Box 331
Glencoe, Illinois 60022

Clean Water: It's Up to You
Izaak Walton League of America
1326 Waukegan Road
Glenview, Illinois 60025

Book - Death of Sweet Water
Don Carr, Norton Press, 1966.

Audio-Visual:

Films:

City Water Supply, 10 min.
#0433, BAVI

Water for Farm and City
14 min., #4816, BAVI

Conserving Our Water Resources Today, 11 min., color, #5367, BAVI

Community:

Director of Public Works

Continued and Additional Suggested Learning E

The World's Water

About the best any of us could do if asked amount of water in all of the world's rivers "That has to be a lot of water."

Yet, the atmosphere contains 10 times as m of the rivers of the world. The 0.001 per cen total water volume held in the atmosphere is, 1/9th. the water contained in the fresh water world. Seas & Saline lakes contain 8 times as the atmosphere.

The 2 icecaps, the Antarctic & Arctic, con cent of the world's water. The Antarctic, wit of the total icecap capacity, is much larger

Second to the Antarctic Icecap in volume i This source holds .632 percent of the world's water within 1/2 mile of the earth's surface of the earth's total water.

All quantities of water appear small when oceans of the world where 317,000,000 cubic m world's water resists our use by being salty.

Man must learn to use water wisely as only one % of the world's fresh water is accessibl

Complete the following table: The World's

	PERCENT OF TOTAL
The Oceans	(A)
Seas and Saline Lakes	(B)
Fresh Water Lakes	(C)
Antarctic Icecap	(D)
Arctic Icecap	(E)
Rivers	(F)
Atmosphere Water	(G)
Ground Water	(H)
*Deep Ground Water	(I)

(J) With few exceptions only the water in fre rivers, & ground water within 1/2 mile of available for man's use. Therefore, what total supply is usable? _____

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e Materials

Learn
Water

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of America

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ity
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Resources
or, #5367,

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Continued and Additional Suggested Learning Experiences

The World's Water

About the best any of us could do if asked to estimate the amount of water in all of the world's rivers would be to say, "That has to be a lot of water."

Yet, the atmosphere contains 10 times as much water as all of the rivers of the world. The 0.001 per cent of the world's total water volume held in the atmosphere is, however, only 1/9th. the water contained in the fresh water lakes of the world. Seas & Saline lakes contain 8 times as much water as the atmosphere.

The 2 icecaps, the Antarctic & Arctic, contain 2.150 percent of the world's water. The Antarctic, with 1.996 percent of the total icecap capacity, is much larger than the Arctic.

Second to the Antarctic Icecap in volume is ground water. This source holds .632 percent of the world's water. Ground water within 1/2 mile of the earth's surface contains .315% of the earth's total water.

All quantities of water appear small when compared to the oceans of the world wher 317,000,000 cubic miles of the world's water resists our use by being salty.

Man must learn to use water wisely as only about 1/3 of one % of the world's fresh water is accessible for use.

Complete the following table: The World's Water

	PERCENT OF TOTAL
The Oceans	(A)
Seas and Saline Lakes	(B)
Fresh Water Lakes	(C)
Antarctic Icecap	(D)
Arctic Icecap	(E)
Rivers	(F)
Atmosphere Water	(G)
Ground Water	(H)
*Deep Ground Water	(I)

*Below 1/2 mile of surface

(J) With few exceptions only the water in fresh water lakes, rivers, & ground water within 1/2 mile of the surface is available for man's use. Therefore, what % of the total total supply is usable? _____

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ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT 5. An adequate supply of clean air is essential because most organisms depend on oxygen, through respiration, to release the energy in their food.

Discipline Area Math

Subject Graphs and

Problem Orientation Pollut

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIEN	II. Ou Com
Cognitive: The student will construct graphs showing the major sources of pollution and their pollutants. Affective: The student will actively participate in developing a plan for eliminating air pollution. Skills to be Learned Constructing graphs Computation involving percents	I. Student-Centered in class activity A. Air Pollution Calculation 1. First the instructor will hand out the worksheet pertaining to sources of air pollution. The students will be asked to follow the instructions at the bottom of the worksheet. 2. The students will find what percent of the total each of the four categories encompass. 3. Go over the results of this exercise in class the next day. Note: A sample of the worksheet on sources of air pollution is on the reverse side.	A. B. C.

equate supply of clean air

tial because most organisms

n oxygen, through respiration,

se the energy in their food.

Discipline Area Math

Subject Graphs and Percents

Problem Orientation Pollution Grade 8

AL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
he student will aphs showing the s of pollution llutants. he student will ticipate in plan for air pollution.	I. Student-Centered in class activity A. Air Pollution Calculation 1. First the instructor will hand out the worksheet pertaining to sources of air pollution. The students will be asked to follow the instructions at the bottom of the worksheet. 2. The students will find what percent of the total each of the four categories encompass. 3. Go over the results of this exercise in class the next day. Note: A sample of the worksheet on sources of air pollution is on the reverse side.	II. Outside Resource and Community Activities A. The students can write to the major auto producers for a list of pollution control devices on cars today. 1. The students should compare any percentages they have obtained with the results of their class activities. 2. The students can orally report on their findings to the class. B. Have an outside speaker from local industry talk to the students on pollution control (especially air pollution) within local industry. C. Have a DNR representative talk to the class on air pollution caused at land fill sites.
Learned graphs involving		

Resource and Reference Materials

Publications:

VF U.S. Dept. of HEW, Clean Air for Your Community, Environmental Health Service I-C-E RMC

Books: Quest for Cleaner Air & Water, I-C-E RMC
Conserving Our Waters & Cleaning the Air, I-C-E RMC

Audio-Visual:

Simulation Game:

SG 1 Smog; The Air Pollution Game I-C-E RMC

Films:

Air Pollution, #0678, BAVI
Poisoned Air, Carousel Films

Community:

Local industry representative
DNR representative

Continued and Additional Suggested Learni

AIR POLLUTION IS ONE OF AMERICA'S GREATEST

Sources	MILLION TONS Carbon Monoxide	Sulphu Nitrog Cas
90 Million Motor Vehicles 99% burn gasoline, with pollution from exhaust pipe, crank case, carburetor & gas tank.	65	8
Factories and Power Plants Especially pulp & paper mills, iron & steel mills, refineries, smelters & chemical plants. Over 90% of power plants in 1969 burned coal & oil containing sulphur to generate electricity.	12	38
Refuse Disposal And Miscellaneous Each person creates about 1800 lbs. of waste per yr.	17	2
	94	48

TOTAL MILLION TONS AIR POLL

Using the data above, construct a circle g
category; motor vehicles, factories and p
refuse & miscellaneous. Construct a bar g
total air pollution comparisons between c
sulphur & nitrogen gases, hydrocarbons, &

ce Materials

Clean Air

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ner Air &
MC
Waters &
ir, I-C-E RMC

llution Game

BAVI
el Films

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Continued and Additional Suggested Learning Experiences

AIR POLLUTION IS ONE OF AMERICA'S GREATEST PROBLEMS

Sources	MILLION TONS POLLUTION Carbon Monoxide	Sulphur, Nitrogen Cases	Hydro-Carbons	Particulates	Total
90 Million Motor Vehicles 99% burn gasoline, with pollution from exhaust pipe, crank case, carburetor & gas tank.	65	8	18	1	92
Factories and Power Plants Especially pulp & paper mills, iron & steel mills, refineries, smelters & chemical plants. Over 90% of power plants in 1969 burned coal & oil containing sulphur to generate electricity.	12	38	5	17	72
Refuse Disposal And Miscellaneous Each person creates about 1800 lbs. of waste per yr.	17	2	4	4	27
	94	48	27	22	191

TOTAL MILLION TONS AIR POLLUTION PER YEAR

Using the data above, construct a circle graph for each category; motor vehicles, factories and power plants, refuse & miscellaneous. Construct a bar graph showing total air pollution comparisons between carbon monoxide, sulphur & nitrogen gases, hydrocarbons, & particulates.

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT 6. Natural resources are not equally distributed over the earth or over time and greatly affect the geographic conditions and quality of life.

Discipline Area Math

Subject Charts

Problem Orientation Clea

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EX
Cognitive: By constructing a chart, the students will compare the depth and area of the 5 Great Lakes. Affective: The student will be aware of the effect of farming on the water supply.	I. Student-Centered in class activity A. Compare the 5 Great Lakes 1. Work computations on the worksheet of the Great Lakes.* 2. Construct a chart showing the information. B. Waste from animals compared to human waste. 1. Waste of 1 cow equals waste of 16 humans 2. Waste of 1 pig equals waste of 2 humans 3. Waste from 7 chickens equals waste from 1 human. C. Given the above information, have the students calculate the waste material given off on an average Wis. farm. (The students should investigate what is the average farm.) Note on back. D. Make the reverse comparison of a local city and the waste products given off would equal the amount given off by the various farm animals. *Worksheet on reverse side
Skills to be Learned Finding area Finding Averages Basic computation	II.

resources are not equally

d over the earth or over

reatly affect the

conditions and quality of life.

Discipline Area Math

Subject Charts and Problem Solving

Problem Orientation Clean Water Grade 8

OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
constructing tudents will pth and area Lakes. student of the ing on ly.	I. Student-Centered in class activity A. Compare the 5 Great Lakes 1. Work computations on the worksheet of the Great Lakes.* 2. Construct a chart showing the information. B. Waste from animals compared to human waste. 1. Waste of 1 cow equals waste of 16 humans 2. Waste of 1 pig equals waste of 2 humans 3. Waste from 7 chickens equals waste from 1 human. C. Given the above information, have the students calculate the waste material given off on an average Wis. farm. (The students should investigate what is the average farm.) Note on back. D. Make the reverse comparison of a local city and the waste products given off would equal the amount given off by the various farm animals. *Worksheet on reverse side	II. Outside Resource and Community Activities A. Find out how much water is needed by some of our local cities for human consumption & compare this to the amount needed by local industries. This information may be obtained from city water dept. & from the public relations of industries. B. Together with the service dept., test various water sources from the lakes, rivers & streams in community. C. Have your home water supply tested. Information may be obtained by writing to the state health board. D. Find out if Wis. has set up water standards. Try to find out if other states have standards. E. Field trip to local water supply system. F. Compute own water bill.
earned es ion		

Resource and Reference Materials	Continued and Additional Suggested Learning
Publications: In Quest of Cleaner Air & Water, I-C-E RMC Conserving Our Waters & Cleaning the Air, I-C-E RMC Audio-Visual: Simulation Game: Dirty Water: The Water Pollution Game, I-C-E RMC Films: The Water Cycle, 10 min. Encyclopedia Britannica Films Life in a Drop of Water, 10 min. BAVI Community: Field trip to a farm near your community Field trip to your local water supply	The Great Lakes No other group of fresh water lakes is as Great Lakes. The largest, Lake Superior, cov square miles and has the record depth of 1,3 Lake Michigan, the only Great Lake that is within the boundaries of the United States, square miles and has a maximum depth of 923 Lake Huron, second of the Great Lakes in s area of 23,010 square miles and a maximum dep The shallowest of the Great Lakes is Lak maximum depth of 210 feet. Its area is 9,940 Lake Ontario, the smallest, has an area o miles and a maximum depth of 778 feet. The natural flow of Great Lakes water is east and eventually to the Atlantic Ocean th Lawrence River. The reason for the west to e that Lake Superior is 602 feet above sea lev Ontario on the east is only 247 feet above s large portion of this change in sea level tak between Lake Erie and Lake Ontario with a 32 (A) What is the total area of all the Great (B) What is the average depth of the Great La foot)? (C) What is the drop in feet above sea level Superior and Lake Ontario? (D) What is the difference in depth between and the shallowest of the Great Lakes? (E) What is the drop in height above sea lev Lake Superior and Lake Erie? Copr. Christopher Lee Publications I.C. Note: How does animal waste affect water quali

Materials	Continued and Additional Suggested Learning Experiences

r & Water,

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The Great Lakes

No other group of fresh water lakes is as large as the Great Lakes. The largest, Lake Superior, covers 31,820 square miles and has the record depth of 1,302 feet.

Lake Michigan, the only Great Lake that is entirely within the boundaries of the United States, covers 22,400 square miles and has a maximum depth of 923 feet.

Lake Huron, second of the Great Lakes in size, has an area of 23,010 square miles and a maximum depth of 750 feet.

The shallowest of the Great Lakes is Lake Erie with its maximum depth of 210 feet. Its area is 9,940 square miles.

Lake Ontario, the smallest, has an area of 7,540 square miles and a maximum depth of 778 feet.

The natural flow of Great Lakes water is from west to east and eventually to the Atlantic Ocean through the St. Lawrence River. The reason for the west to east flow is that Lake Superior is 602 feet above sea level and Lake Ontario on the east is only 247 feet above sea level. A large portion of this change in sea level takes place between Lake Erie and Lake Ontario with a 326 foot drop.

(A) What is the total area of all the Great Lakes?
(B) What is the average depth of the Great Lakes (to nearest foot)?
(C) What is the drop in feet above sea level between Lake Superior and Lake Ontario?
(D) What is the difference in depth between the deepest and the shallowest of the Great Lakes?
(E) What is the drop in height above sea level between Lake Superior and Lake Erie?

Copr. Christopher Lee Publications

I. C. Note:
How does animal waste affect water quality?

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT 7. Factors such as facilitating transportation, economic conditions, population growth, and increased leisure time have a great influence on changes in land use and centers of population density.

Discipline Area

Subject

Problem Orientation

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNI	II.
Cognitive: The students will identify through a written report and graph, the effects of population density on their state's natural environment. Affective: Students will realize how population density affects the life of an individual. Skills to be Learned Computational skills Addition Subtraction Multiplication Division Research	I. Student-Centered in class activity A. Group Research 1. Compute the square feet in the classroom. 2. Determine the amount of space each student occupies. 3. Students should use resource material to find the average amount of oxygen used per student. 4. Calculate the length of time it would take a student to use up all the air in the room. 5. Graph (line) the above information. 6. Calculate the length of time air would be used up with fewer students. 7. Graph (line) the information found in #5 on the same graph found in #4.	C A B C

s such as facilitating transporta-
nomic conditions, population
nd increased leisure time have a
luence on changes in land use and
f population density.

Discipline Area Math

Subject Computation

Problem Orientation Population Density Grade 8

AL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
e students through a t and graph, f population eir state's onment. udents will opulation ts the life ual. Learned skills on	I. Student-Centered in class activity A. Group Research 1. Compute the square feet in the classroom. 2. Determine the amount of space each student occupies. 3. Students should use resource material to find the average amount of oxygen used per student. 4. Calculate the length of time it would take a student to use up all the air in the room. 5. Graph (line) the above information. 6. Calculate the length of time air would be used up with fewer students. 7. Graph (line) the information found in #5 on the same graph found in #4.	II. Outside Resource and Community Activities A. City population 1. Gather data on the area of the city and the population of the city. 2. Determine the rate of population growth in the last 30 years. B. City nurse 1. Give information on air intake by humans. 2. Give information about diseases caused by air pollution. C. Visit by city planner or any city official. 1. Discuss air pollution. 2. Discuss leisure time activity.

Resource and Reference Materials	Continued and Additional Suggested Learning Ex
Publications: Books: Too Many People? Kimball, Richard Solving the Problems of Over-Population, The Effects of Over-Population, The Population Explosion, Kimball, Richard Audio-Visual: Air Pollution: Take a Deep Deadly Breath, National Medical AV Center Chamblee, Ga. 30005 Simulation Game: Smog: The Air Pollution Game I-C-E RMC Community: Court House for population information City library City or school nurse	

erence Materials	Continued and Additional Suggested Learning Experiences
Kimball, Richard lems of Over- Effects of Over- Population all, Richard	
ke a Deep Deadly	
/V Center C005	
llution Game	
opulation	
rse	

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT

8. Cultural, economic, social, and political factors determine status of man's values and attitudes toward his environment.

Discipline Area: Mathematic

Subject: Fractions

Problem Orientation: Attitud

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPE	
Cognitive: After participating in class discussion, the students will solve exercises pertaining to the effects of the newspaper industry on our forests. Affective: The students will realize they should advocate more conservational use of our forests. Skills to be Learned Collecting data Finding multiples of a number Calculating fractions	I. Student-Centered in class activity A. Given the following information: It takes 17 trees to make a ton of newsprint; the students will solve the following problems with the teacher's assistance: 1. How many trees would it take to make 51 million tons of newsprint? 2. 53 million tons of newsprint 3. 119 million tons? 4. 74 million tons? 5. 1 billion tons?	II. Out Con A.

Cultural, economic, social,

political factors determine

us of man's values and attitudes

rd his environment.

Discipline Area Mathematics

Subject Fractions & Multiples

Problem Orientation Attitudes Grade 8

AVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
e: After partici- n class discussion, ents will solve s pertaining to cts of the news- dustry on our e: The students lize they should more conservational ur forests.	I. Student-Centered in class activity A. Given the following information: It takes 17 trees to make a ton of newsprint; the students will solve the following problems with the teacher's assistance: 1. How many trees would it take to make 51 million tons of newsprint? 2. 53 million tons of newsprint 3. 119 million tons? 4. 74 million tons? 5. 1 billion tons?	II. Outside Resource and Community Activities A. The students will collect the newspaper used in their home for a week. 1. After the week they will weigh this newspaper and determine the approximate weight of the newspaper their family would use in a year by multiplying the above weight by 52. 2. Then they will answer how many trees were used in making that amount of newsprint? 3. Next the students will figure out how many trees were used in making the newspaper in their block for a (Con't)
o be Learned nc data multiples of a irg fractions		

Resource and Reference Materials	Continued and Additional Suggested Learning Experience
Publications: Trees and Forests, Stanley M. Jespen 1969 Barnes, $6.95 Audio-Visual: Forest and Conservation (Color $.50) (Gen. Science) BAVI 1327 University Ave. P.O. Box 2093 Madison, Wis. 53701 Community: Local newspaper Conservationist	(Con't from II.) year by multiplying by the number of families living in the block. 4. Finally the students will figure out how many trees were used in making the newspaper in their town for a year by multiplying by the number of families living in the town. B. The students will contact local and nearby newspaper to see how many trees they use in publishing their newspapers in a year. The students will report back to the teacher on their findings in the form of a written report. This information will have to be computed on the basis of the number of tons of newsprin used by the publisher.

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT: 9. Man has the ability to manage, manipulate, and change his environment.

Discipline Area: Math

Subject: Computation

Problem Orientation: Environment Change

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
Cognitive: To construct a bar graph illustrating the board feet of lumber lost on a given plot of land from a forest fire. Affective: The students will realize the importance of the number of board feet lost one given tree. Skills to be Learned 1. Computation skills 2. Terms a. Board feet b. Cubic feet c. Acres	I. Student-Centered in class activity A. Group research 1. Given statements: a. Five acres of land b. 100 trees/acre c. 25 years growth d. Average tree size is 10 inch dia. e. Tree type-white pine 2. Calculate the number of board feet per acre 3. Construct a bar graph illustrating the number of board feet per acre lost in a forest fire. 4. Construct a bar graph illustrating the number of board feet lost per tree in a forest fire.	II. Outside Resour Community Acti A. The student correspond the Dept. o Resources t out the ave growth of w in Wis. ove year period B. Have the di forest rang information trees, espe white pine by speaking group.

ability to manage,

change his

Discipline Area Math

Subject Computation

Problem Orientation Environment / Change Grade 8

JECTIVES	SUGGESTED LEARNING EXPERIENCES	
struct rating lumber ot of fire. dents nportance oard n tree.	I. Student-Centered in class activity A. Group research 1. Given statements: a. Five acres of land b. 100 trees/acre c. 25 years growth d. Average tree size is 10 inch dia. e. Tree type-white pine 2. Calculate the number of board feet per acre 3. Construct a bar graph illustrating the number of board feet per acre lost in a forest fire. 4. Construct a bar graph illustrating the number of board feet lost per tree in a forest fire.	II. Outside Resource and Community Activities A. The student can correspond with the Dept. of Natural Resources to find out the average growth of white pine in Wis. over a 25 year period. B. Have the district forest ranger supply information about trees, especially the white pine in Wis. by speaking to the group.
ed lls		

Resource and Reference Materials	Continued and Additional Suggested Learnin
Publications: 11971 EQ Index, National Wildlife Federation, 1412 16th St. N.W. Washington, D.C. 20036 Audio-Visual: Visual Aid Library, Box 450, Madison, Wis 53701 Tomorrows Trees (color) 32 min. Community: Community library for information about white pines and the state of Wis. District forest ranger	

d Reference Materials	Continued and Additional Suggested Learning Experiences
s: dex, National Wildlife 1412 16th St. N.W. D.C. 20036 l: Library, dison, rees (color) 32 min. ibrary for infor- t white pines and f Wis. rest ranger	

ESEA Title III - 59-70-0135-2 Project I-C-E

C O N C E P T 10. Short-term economic gains may produce long-term environmental losses.

Discipline Area Math

Subject Division & Pro

Problem Orientation Mineral Use

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENC	
Cognitive: The students will make a comparison between our present and future consumption of natural resources on a chart. Affective: The students will advocate more conservative use of our natural resources. Skills to be Learned Computation Research	I. Student-Centered in class activity A. Given problem 1. If we have a reserve supply of zinc equaling 10 billion lbs. and a population of 200 million, how long will the zinc last if each person uses 5 lbs. a year. 2. Make up similar problems using other minerals a. Lead b. Tin c. Petroleum d. Copper e. Uranium f. Iron ore g. Coal 3. Variation-Have students make-up problems and exchanging them with fellow students for computation. 4. Share with students the following table of consuption based on current consumption. (Con't)	II. Outside Communi A. Fiel area B. Have two 1. C R % H L The 2. W C C V B B C. The glea retu used prob puta

-term economic gains may

ong-term environmental

Discipline Area Math

Subject Division & Problem Solving

Problem Orientation Mineral Use Grade 8

RAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
he students comparison present consumption esources he students e more use of our urces.	I. Student-Centered in class activity A. Given problem 1. If we have a reserve supply of zinc equaling 10 billion lbs. and a population of 200 million, how long will the zinc last if each person uses 5 lbs. a year. 2. Make up similar problems using other minerals a. Lead b. Tin c. Petroleum d. Copper e. Uranium f. Iron ore g. Coal 3. Variation-Have students make-up problems and exchanging them with fellow students for computation. 4. Share with students the following table of consuption based on current consumption. (Con't)	II. Outside Resource and Community Activities A. Field trip to an area quarry. B. Have class compose two letters one to: 1. Citizen Nat. Resource Asso. % Carla Kruse Hickory Hill Farm Loganville, Wis. The other to: 2. Wisconsin Resource Conservation Council, %Vance Van Laanen Box 1034, Green Bay, Wis. 54305 C. The information gleaned from above returns could be used to make realistic problems for computation.
Learned		

Resource and Reference Materials	Continued and Additional Suggested Learning Experienc
Publications: America's Natural Resources, Charles H. Callison Conservation in The United States 2nd ed., Rand McNally, 1969m Richard M. Highsmith Audio-Visual: The New York Times, KT 6, Crisis of the Environment Projec§ I-C-E Community: 1. Quarry in area 2. DNR official from area 3. Library	(Con't from I. A.) Number of years reserve minerals willbbe consumed a. Zink-20 yrs. b. Lead-25 yrs. c. Tin -30 yrs. d. Petroleum -30 yrs. e. Copper-35 yrs. f. Uranium -35 yrs. g. Iron Ore-350 yrs. h. Coal-450 yrs. 5. Discuss possible ways of slowing consumption.

CONCEPT 11. Individual acts, duplicated or compounded, produce significant environmental alterations over time.

Discipline Area Math

Subject Decimal Numera

Problem Orientation Pollution

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCE
Cognitive: By converting fractions to decimals the student will answer questions which show how much one automobile pollutes the air. Affective: The student will advocate that auto manufacturers should develop some device to help stop automobile air pollution. Skills to be Learned 1. Converting fractions to terminating and repeating decimals. 2. Data conversion 3. Information gathering	I. Student-Centered in class activity A. Go through the list of problems on the board. 1. Students answer parts a and b with the teachers assistance. B. In 1967 United States passenger cars totaled 80,414,000. They emitted 61,000,000 tons of carbon monoxide into the air. a. On an average, each car was responsible for emitting how much carbon monoxide into the air? b. At that rate 1 person driving a car for 50 years would have caused how much carbon monoxide to pollute the air? C. Using the following statistics answer the same two questions for these chemicals: (Con't)

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al acts, duplicated

produce significant

alterations over time.

Discipline Area Math

Subject Decimal Numerals and Real Numbers

Problem Orientation Pollution Grade 8

BJECTIVES	SUGGESTED LEARNING EXPERIENCES	
verting nals the er ow how e udent auto ld e to le	I. Student-Centered in class activity A. Go through the list of problems on the board. 1. Students answer parts a and b with the teachers assistance. B. In 1967 United States passenger cars totaled 80,414,000. They emitted 61,000,000 tons of carbon monoxide into the air. a. On an average, each car was responsible for emitting how much carbon monoxide into the air? b. At that rate 1 person driving a car for 50 years would have caused how much carbon monoxide to pollute the air? C. Using the following statistics answer the same two questions for these chemicals: (Con't)	II. Outside Resource and Community Activities A. Divide the students into groups and ask them to find data similar to that given in class; however, gather data pertaining to years since 1967. B. Conduct a visitation to the local police station. Here the students will ask local police for data relevant to local pollution caused by autos. 1. How many autos are in the community? 2. When is the busiest time in the community and why? C. Students could write the Wis. Dept. of Trans. Motor Vehicle Div. for recent data on air pollution caused by Wis. cars.
ed tions to repeating hering		

Resource and Reference Materials	Continued and Additional Suggested Learning Experiences
Publications: The Breath of Life, Donald E. Carr, Norton, 1965, $4.95 Poisons in the Air, Ed Edelson Pocket Books, 1966 Audio-Visual: Film, Poisoned Air, Carousel Films, 1501 Broadway, New York, N.Y. Discussion with Auto and Oil Companies Air Pollution, (Color) Journal, 11 minutes, 1968 Community: 1. Local police information bulletins. 2. Library 3. Motor vehicle dept.	(Con't from I. C.) a. Hydrocarbons 16,000,000 tons in 1967 b. Nitrogen Oxides 6,000,000 tons in 1967 c. Lead 210,000 tons in 1967

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CONCEPT		
12. Private ownership must be regarded as a stewardship and should not encroach upon or violate the individual right of others.	Discipline Area	Math
	Subject	Averaging and P
	Problem Orientation	Farm Ownershi

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
Cognitive: The student will compute the average (mean) size of a farm in the county and percent of land area taken by farms. Affective: Student will realize that the average size of farms is increasing, while the percent of land area in farms is decreasing. Skills to be Learned Computation Terms Percent Mean Land area	I. Student-Centered in class activity A. See reverse side for information on Outagamie County. B. Students will gather similar information for their own county and compare the results with Outagamie County. 1. Number of farms 2. Size of farms 3. Increases between any two year period 4. Percent of land area in farms 5. Total increase	II. Outside Community A. Speake conser B. Compar privat to pub land. C. Compar park a privat D. Calcul of the the nu availa public Note: Inf B,C obt stu DNR Mad reg

ivate ownership must be

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croach upon or violate

dividual right of others.

Discipline Area Math

Subject Averaging and Percents

Problem Orientation Farm Ownership Grade 8

IORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
The student will e average (mean) farm in the percent of land by farms. Student: will at the average rms is increasing, percent of land rms is decreasing.	I. Student-Centered in class activity A. See reverse side for information on Outagamie County. B. Students will gather similar information for their own county and compare the results with Outagamie County. 1. Number of farms 2. Size of farms 3. Increases between any two year period 4. Percent of land area in farms 5. Total increase	II. Outside Resource and Community Activities A. Speaker from soil conservation office. B. Compare the ratio of privately owned land to publicly owned land. C. Compare the public park acreage to the privately owned land. D. Calculate the density of the population to the number of acres available to the public. Note: Information for B,C,D, may be obtained by the students from the DNR office in Madison and/or its regional offices.
be Learned n		

Resource and Reference Materials	Continued and Additional Suggested Learning Exper

Publications:

Population Growth and Land Use, Clark, Colin, St. Martin's, 1967.

The Last Landscape, Whyte, William H., Jr., Doubleday, 1968.

Audio-Visual:

Our Vanishing Land, McGraw Hill

Community:

Speaker from local soil conservation office

I. Information on Outagamie County

Cutagamie County, Wisconsin has a total of acres. The student will be given the year, the number of farms and the total farm acreage. Th will find the average size of farms and the pe land area in farms.

Year	Total Number of Farms	Total Farm Acreage	Average Size of Farms	Percent Land Ar in Farm
1860	1,131	92,861		
1870	2,226	187,470		
1880	2,936	245,186		
1890	3,254	277,394		
1900	3,479	319,569		
1910	3,650	336,007		
1920	3,746	347,824		
1925	3,829	346,089		
1930	3,460	336,179		
1935	3,903	358,022		
1940	3,558	356,833		
1945	3,433	367,639		
1950	3,409	370,626		
1960	2,793	345,935		

ce Materials	Continued and Additional Suggested Learning Experiences
Land Use, rtin's, 1967. Whyte, William 1968. McGraw Hill oil	I. Information on Outagamie County Outagamie County, Wisconsin has a total of 405,760 acres. The student will be given the year, the total number of farms and the total farm acreage. The student will find the average size of farms and the percent of land area in farms.

Year	Total Number of Farms	Total Farm Acreage	Average Size of Farms	Percent of Land Area in Farms
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1870	2,226	187,470		
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PROJECT I-C-E Episode Evaluation Form (Reproduce or duplica

Please fill in:
Subject: _____

Grade: _____

Concept No. Used: _____

In commenting on each episode used in you
form. Feel free to adapt it and add more p
your critiques and comments - negative and
hand column, please rate (poor, good, excel
make specific comments or suggestions if po
vided to help us make this a more usable gu

Poor	Good	Exc.	
			I. Behavioral Objectives A. Cognitive:
			B. Affective:
			II. Skills Developed
			III. Suggested Learning Experiences A. In Class:
			B. Outside & Community Activities:
			IV. Suggested Resource & Reference Materials (specific suggestions & comments)

Serv

CT I-C-E Episode Evaluation Form (Reproduce or duplicate as needed)

In commenting on each episode used in your class, please use this form. Feel free to adapt it and add more pages. Let us know all your critiques and comments - negative and positive. In the left-hand column, please rate (poor, good, excellent) each item. Also, make specific comments or suggestions if possible in the space provided to help us make this a more usable guide. Thank you.

I. Behavioral Objectives
A. Cognitive:

B. Affective:

I. Skills Developed

I. Suggested Learning Experiences
A. In Class:

B. Outside & Community Activities:

V. Suggested Resource & Reference Materials
(specific suggestions & comments)

Project I-C-E
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